ONE SHILLING

FLIGHT

and

AIRCRAFT ENGINEER

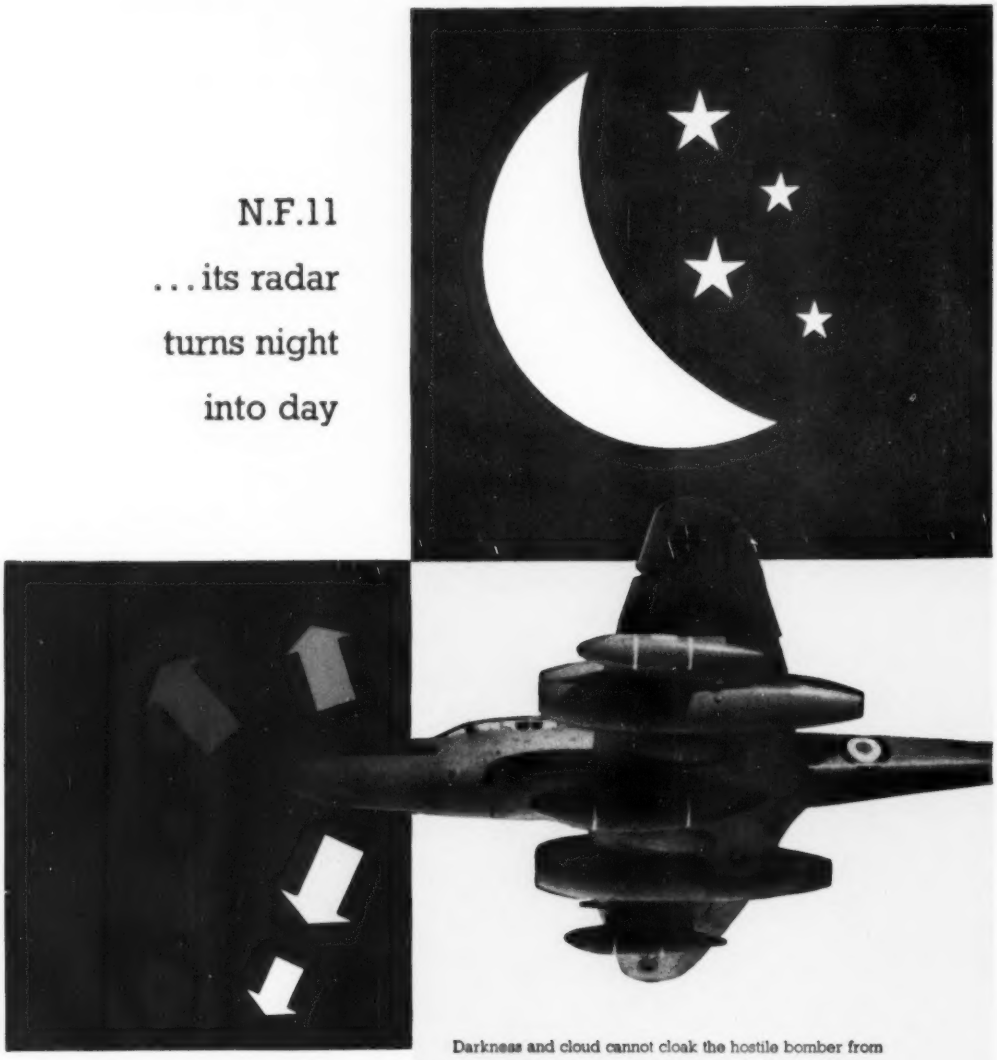
OFFICIAL ORGAN OF THE ROYAL AERO CLUB

Gloster G.A.5

Tyres, Wheels, Brakes by

DUNLOP

N.F.11
...its radar
turns night
into day



Darkness and cloud cannot cloak the hostile bomber from detection and ruthless pursuit by the N.F.11 Night Fighter. Guided by complex, quick-ranging radar, the N.F.11 is fast, manoeuvrable, has a terrific rate of climb and is heavily armed with four 20 mm. wing-mounted cannon. Deliveries to the R.A.F. are being made against production orders which have been placed with Armstrong Whitworth Aircraft; and this deadly night fighter now takes on a major responsibility in the defence of Western Europe.

ARMSTRONG WHITWORTH
N.F.11

MEMBER OF THE HAWKER SIDDELEY GROUP
PIONEER...AND WORLD LEADER IN AVIATION

No. 2...ROMAN

A presentation sword and scabbard dating from A.D. 17, both drawn as if restored. The scabbard is of wood with a bronze shell, part silvered and part gilt.
Armed with his business-like sword and trained in the use of the point, the Roman legionary met no match in close fighting.

FOLLANDS of HAMBLE

are forging the weapons of the future

FOLLAND AIRCRAFT LIMITED, HAMBLE, SOUTHAMPTON

BOAC

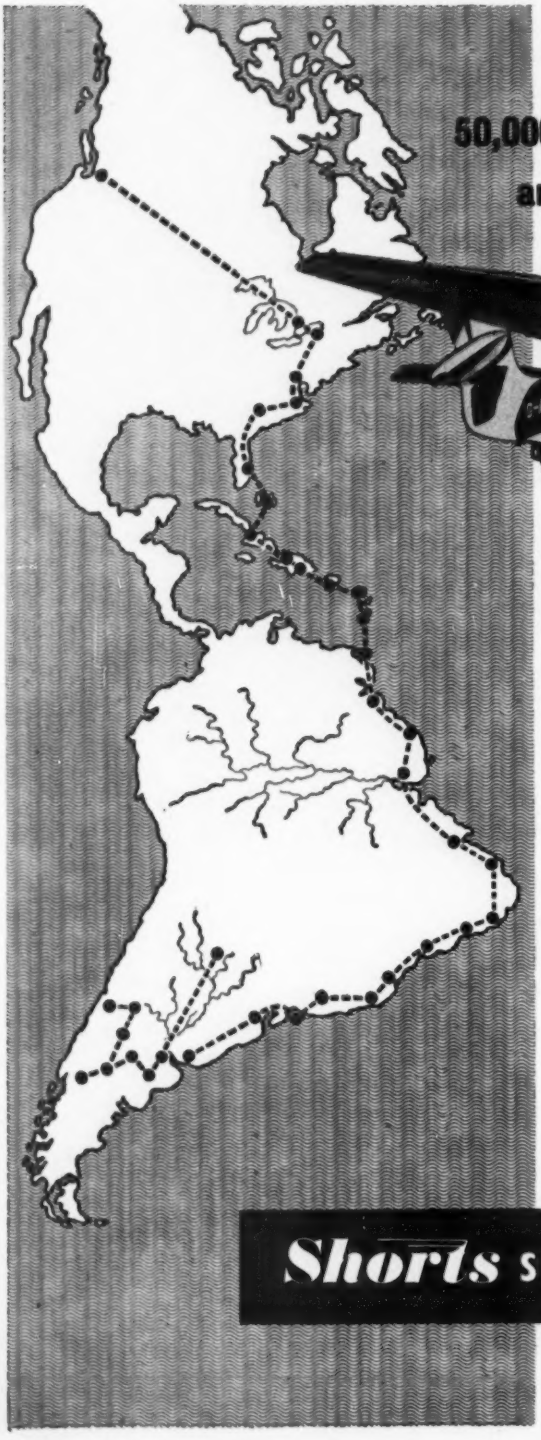
Symbol of British teamwork . . .

The *Comet* jetliner is a fine product of the famous de Havilland Aircraft Company working in close collaboration with British Overseas Airways Corporation and with many manufacturers of aircraft components. Now in service between London and Johannesburg the *Comet* combines speed with comfort and elegance. It comes from an organisation rich in experience and enterprise; it is flown by B.O.A.C. crews with a long and proud tradition of unrivalled airmanship. This is the perfect partnership between manufacturer and operator . . a partnership that has enabled Britain to gain global leadership in air travel.

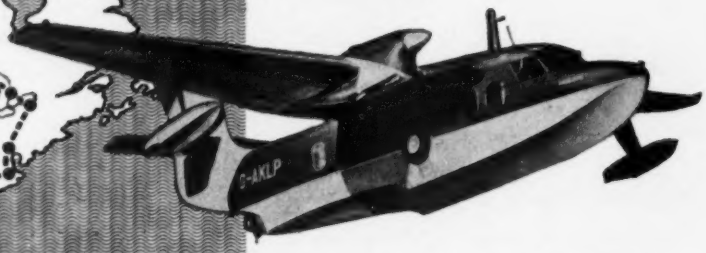
B.O.A.C. TAKES GOOD CARE OF YOU

B·O·A·C

BRITISH OVERSEAS AIRWAYS CORPORATION



50,000 miles... over 500 take-offs and landings



... in all—a twelve-month trouble-free tour of demonstration through the American continents

From the time it left Trinidad in January, 1951, until the time it touched down in Montreal for its annual Certificate of Airworthiness in December of the same year, the sturdy Short Sealand, flying under some of the most adverse and extreme weather conditions — ranging from equatorial sun, through tropical storms, to temperatures below Zero — flew more than 50,000 miles and gave more than 300 demonstrations in its twelve-month tour.

All who flew in it, including many important officials of the numerous countries through which it passed, were high in their praise of its performance.

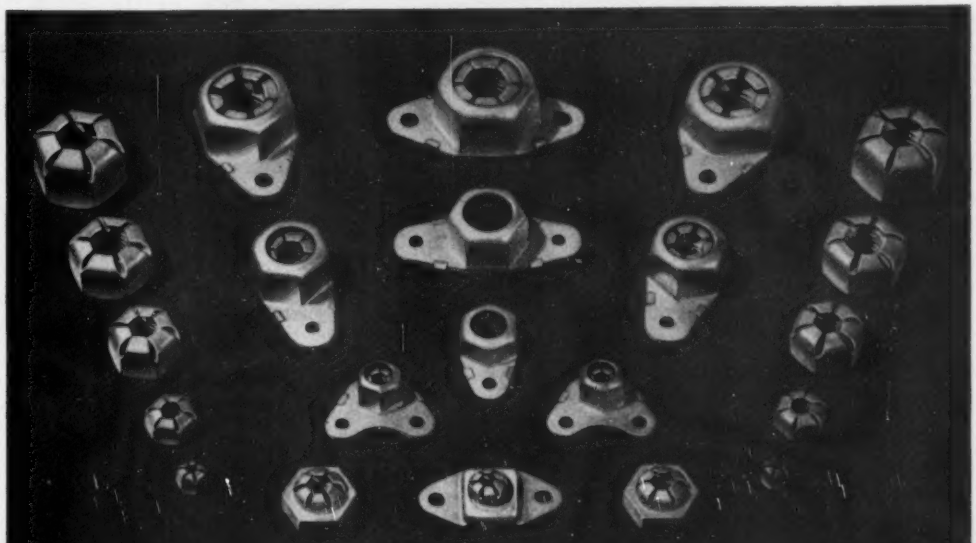
Proving consistently every claim made by its manufacturers, the aircraft flew into remote and formerly inaccessible places. It covered a multitude of duties ranging from freighting to fishing, and solved many of the problems facing various business concerns — just as other Sealands are successfully tackling unusual tasks in many other parts of the world to-day.

Shorts SEALAND AMPHIBIAN

Short Brothers & Harland Ltd., Queens Island, Belfast
London Office: 17 Grosvenor Street, W.1.

qp25

FOCUS ON **ODDIE STIFF NUTS**



Manufacture and maintenance of stocks of a complete range of Fully Approved **ODDIE STIFF NUTS**... *still another of the ways in which we serve the Aircraft Industry.*

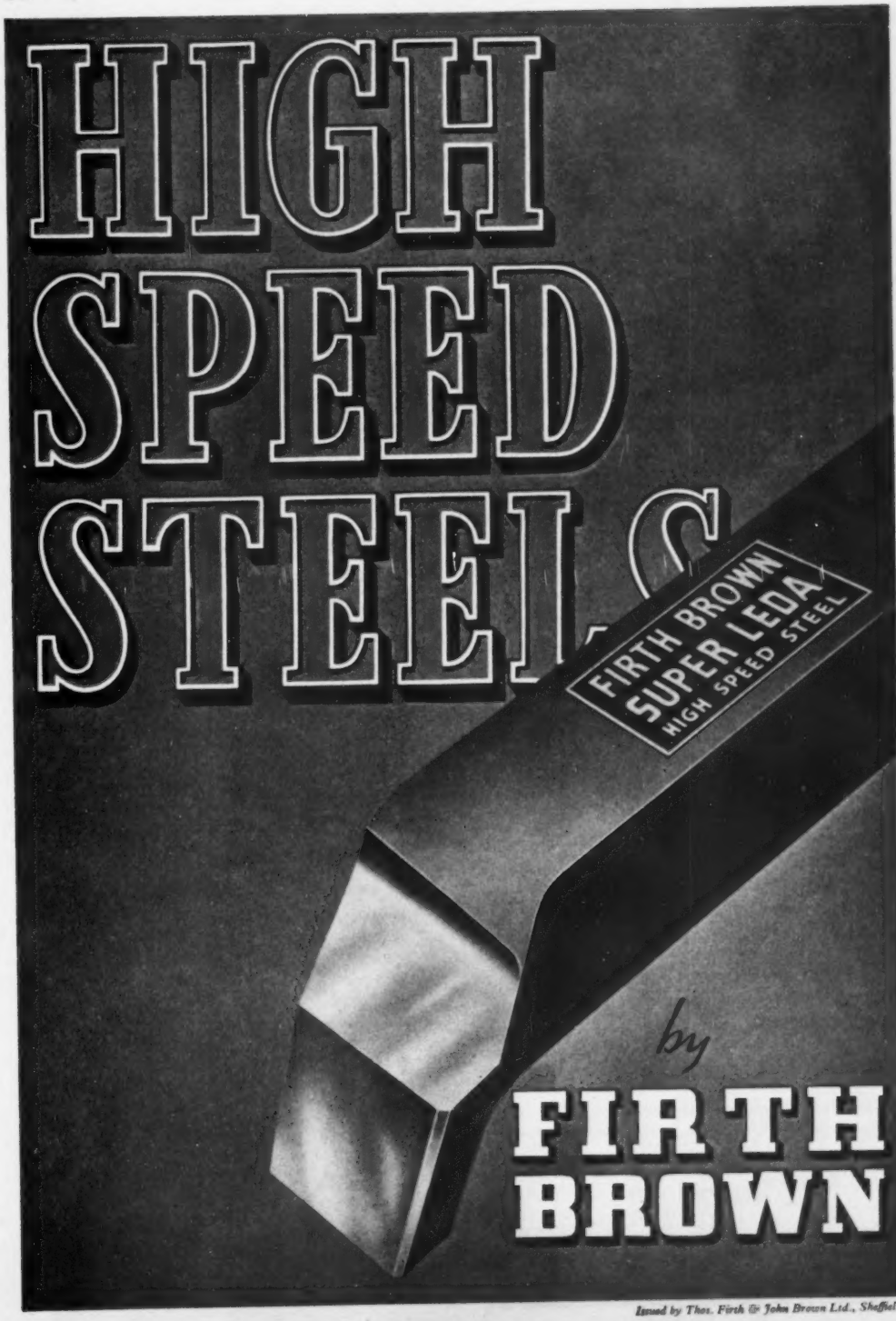
Brown Brothers (AIRCRAFT) Ltd.

The Largest Manufacturers and Stockists of **A.G.S., B.S.S. and S.B.A.C. STANDARD PARTS**

Telephones: **Northampton 4940.** **London: Clissold 1280**

AIRCRAFT AND GENERAL ENGINEERS • HOUGHTON ROAD • NORTHAMPTON

$\frac{x}{(6x\ \text{car})+(5x\ \text{motorcycle})+(42x\ \text{seat})}=1$
QUERY
WHAT IS x ?
ANSWER = 1
BLACKBURN Universal
In the role of a Car Ferry, six Motor Cars plus five Motor Cycles & forty-two Passengers will go into one Blackburn Universal.
More-over, the operating costs and loading time are at a minimum.



Issued by Thos. Firth & John Brown Ltd., Sheffield.

AVIATION TRADERS LIMITED

We offer a selection of spares from our A.R.B. Approved Bonded Stores.

All the items shown below are available in large quantities.

RADIO EQUIPMENT

As used on DAKOTA AIRCRAFT

Aerial Beadweights No. 2, Beads 1.25 in. diameter. Total weight 4 lb. To R.A.F. Sect. Ref. 10B/7706.

10F/126 Switch type 'J' for use on TR.1154/5 Installations.

10K/1258 Rotary Generator type 79, as used on TR.1464 installations.

Large quantities of breakdown spares for SCR 274/N. Command equipment. Complete list available on application.

SCR.578 Dinghy Radio Transmitters, we shall be pleased to receive your inquiries for this equipment.

10J/10596 Indicator Loop, remote control type E.2.

ELECTRICAL EQUIPMENT

We shall be pleased to receive further inquiries for large quantities of "Cannon" and "Amphenol" plugs and sockets now available in our stores. A complete list will soon be available on request.

5E/1363 Cable "Ducel 7."

MISCELLANEOUS

A large selection of Vacuum Pumps type B.3, by Plessey Limited available.

37J/263 Lockheed Hydraulic Pumps.

27B/2216 Oil Coolers, 12 in. diameter.

AGS.808/A Union Nuts, brass, ¼ in. B.S.P.

We are accredited agents for:—

COATES BROS. PAINTS LIMITED

and hold stocks of both aircraft and commercial finishes. All aircraft finishes are released to A.R.B. Regulations or A.I.D. conditions.

All inquiries for any of the above items, or items which are not shown, to our Sales Department, at:—

15, GREAT CUMBERLAND PLACE, LONDON, W.1.

Telephone:	*Telegrams:*	*Cables:*
Ambassador 2091 (5 lines)	"Aviatrade, Wesdo London."	"Aviatrade, London."

Pigs do fly

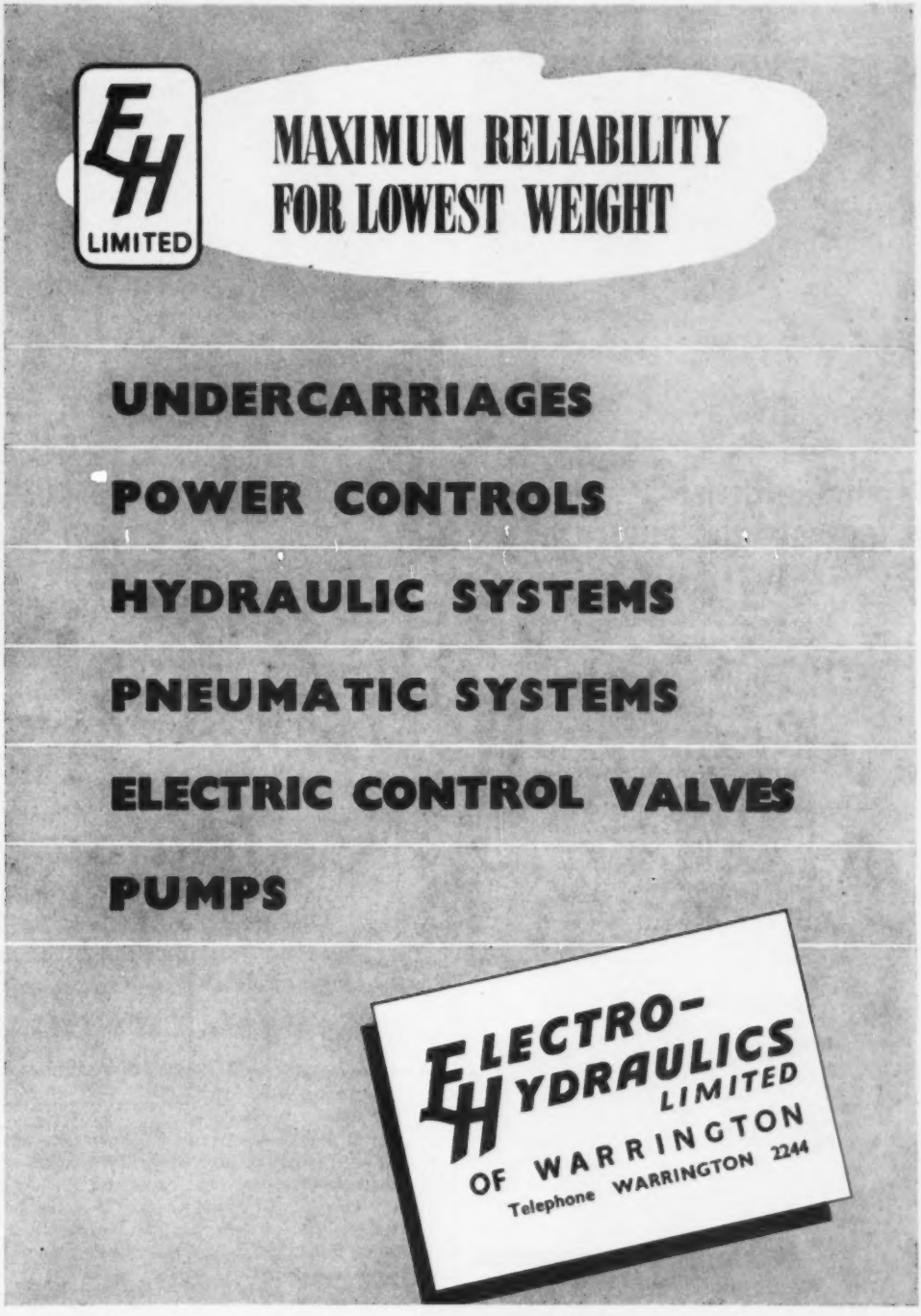
Scientific achievement is playing havoc with a lot of old proverbs nowadays, for prize porkers — as well as many other heavy things — are quite common freight in aircraft. And to make such cargoes bring in as much money as possible, the materials and equipment used in an airliner must afford the maximum efficiency for the minimum tare. That is why Oldham Aircraft Batteries are gaining increased popularity every day, for they are designed to give the greatest output for the least weight.

OLDHAM

POWER TO SPARE

AIRCRAFT BATTERIES

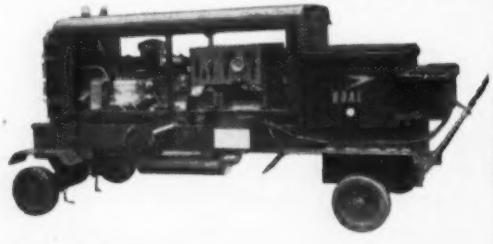
OLDHAM & SON LTD DENTON · MANCHESTER EST. 1865


EH
LIMITED
MAXIMUM RELIABILITY
FOR LOWEST WEIGHT
UNDERCARRIAGES
POWER CONTROLS
HYDRAULIC SYSTEMS
PNEUMATIC SYSTEMS
ELECTRIC CONTROL VALVES
PUMPS
ELECTRO-
HYDRAULICS
LIMITED
OF WARRINGTON
Telephone WARRINGTON 2244

is vital with jets . . .

MUREX GROUND POWER UNITS have power to spare

Nature's methods of starting are swift and sure—the nimble thrush, for example, always gets off to a flying start. The starting of a powerful jet aircraft, however, is not quite so simple. Here, a quick and reliable method of starting the engine is essential. Murex ground power units have been specially developed to provide instant starting for all types of aircraft engines—piston, turbo-jet and turbo-prop. The standard units will supply a peak current of over 1,400 amperes for engine starting periods and a current of 600 amperes continuously at 28 volts for servicing and pre-flight checks. Other capacities are available. Murex units are engine-driven and thus they eliminate the expense of heavy service accumulators. They are used by B.O.A.C., B.E.A., and other world famous airlines for the starting of all the latest types of aircraft.



MUREX AIRCRAFT GROUND POWER UNITS

MUREX WELDING PROCESSES LIMITED,
WALTHAM CROSS, HERTS. TELEPHONE: WALTHAM CROSS 3434.
GPU 10

ACRATORK

MARK VI
PRECISION TORQUE SPANNER
The latest development in Torque control

Test and Setting rigs for all types of Torque Spanners

The ACRATORK spanner is fully automatic. It can be used by unskilled labour with precision results. With ACRATORK it is impossible to exceed the pre-set torque load and its accuracy is unaffected by side loads. Eight standard models to suit a wide range of applications for loads up to 250 lbs. ft. Larger models supplied to special order.

Protected by British and Foreign Patents

World Distributors

CORY BROTHERS & CO. LTD

Cory's Buildings, Cardiff
Telephone: Cardiff 31141

Air Navigation

Theory and Practice

By E. Brook Williams and W. J. V. Branch

An important new book covering a wide and advanced field, and suitable for a number of licences and ratings involving varying degrees of navigational knowledge. Self-tuition requirements are met by the inclusion of many worked examples and specimen questions, with answers. All navigation aids, including up-to-date forms of radar, are described in detail. With 8 plates, 2 insets, and 372 other illustrations. 644 pages. 55/- net.

Published by

Pitman, Parker Street, Kingsway, London W.C.2

FLY AS AN OFFICER IN THE ROYAL NAVY

on National Service or Short Service Commission

THE Royal Navy needs Officer Pilots and Observers. This is your great chance of a future full of adventure and achievement. The Navy will teach you to fly. You'll have Britain's best young men as your friends. You'll see the world in Britain's finest service — the flying spearhead of the Royal Navy.

The job is vital and well paid. 8 years' service carries a gratuity of £1,500, leave is generous and one in every five officers is offered a permanent R.N. commission.

You should be between 17 and 24 years old and fit, with a School Certificate that includes a pass in Maths or a General Certificate of Education with a pass in English, Maths and one optional subject. Post the coupon below for full details.

Former naval pilots and observers up to 33 years of age can rejoin for 4 to 8 years with substantial gratuities.

To Admiralty, C.W. Branch (CM/71) Queen Anne's Mansions, London, S.W.1.

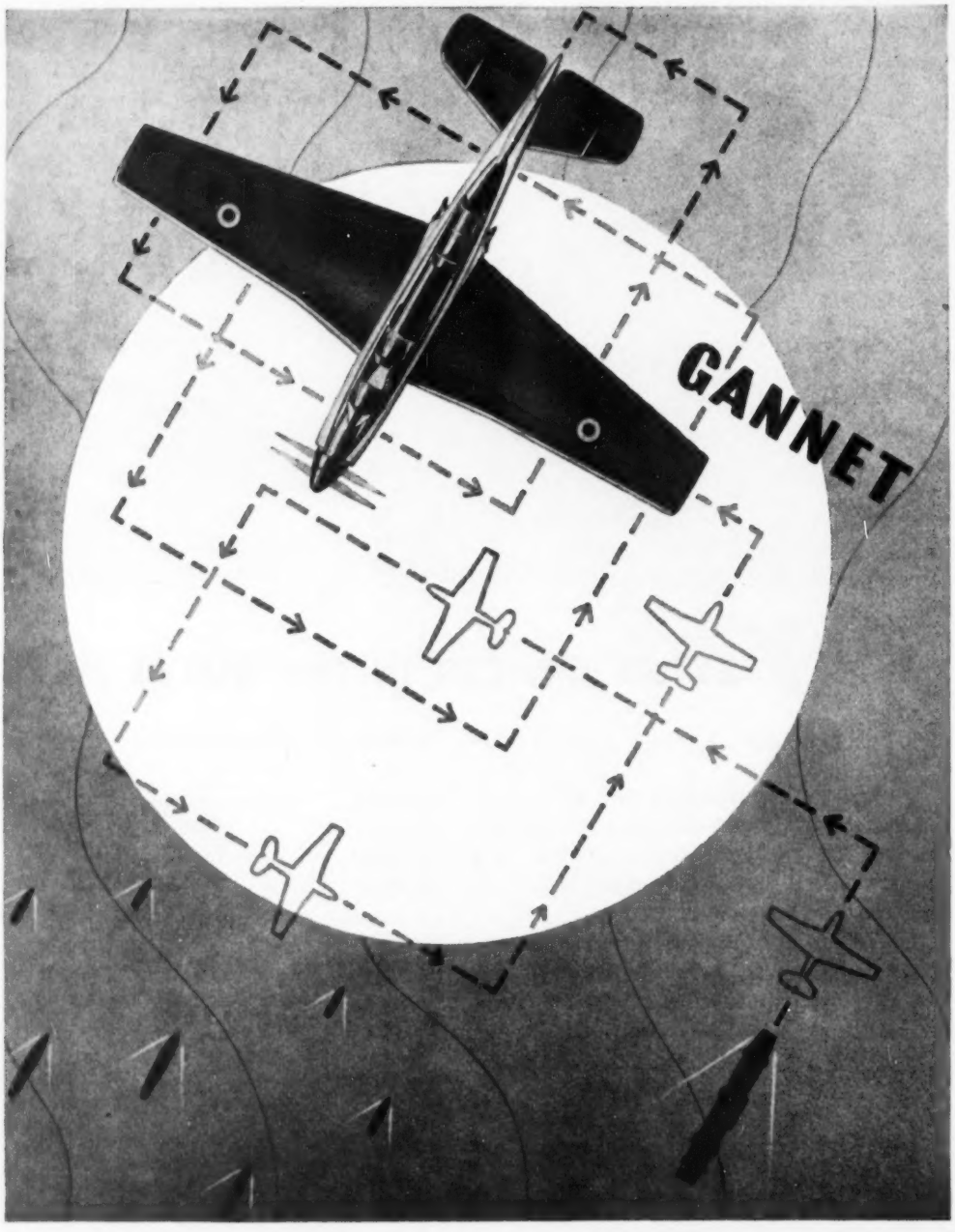
Please send me details without obligation of National Service/Short Service/Rejoining (Tick whichever applies).

Name .....

Address .....

Age .....

C



FAIREY

THE FAIREY AVIATION CO. LTD · HAYES · MIDDLESEX

FLIGHT
and
AIRCRAFT ENGINEER

First Aeronautical Weekly in the World

Founded 1909

No. 2270 Vol. LXII. FRIDAY, 25 JULY 1952

EDITOR
MAURICE A. SMITH, D.F.C.

ASSISTANT EDITOR
H. F. KING, M.B.E.

TECHNICAL EDITOR
C. B. BAILEY-WATSON, B.A.

ART EDITOR
JOHN YOXALL

Editorial, Advertising and Publishing Offices:

DORSET HOUSE,
STAMFORD STREET,
LONDON, S.E.1.

Telegrams, Flightpres, Sedist, London.
Telephone, Waterloo 3333 (60 lines).

Branch Offices:

COVENTRY
8-10, Corporation Street.
Telegrams, Autocar, Coventry.
Telephone, Coventry 5210.

BIRMINGHAM, 2.
King Edward House,
New Street.
Telegrams, Autopress, Birmingham.
Telephone, Midland 7191 (7 lines).

MANCHESTER, 3
260, Deansgate.
Telegrams, Iliffe, Manchester.
Telephone, Blackfriars 4412 (3 lines).
Deansgate 3595 (2 lines).

GLASGOW, C.2.
26b, Renfield Street.
Telegrams, Iliffe, Glasgow.
Telephone, Central 1265 (2 lines).

SUBSCRIPTION RATES
Home and Overseas: Twelve months £3 3s. 0d. U.S.A. and Canada, $10.00
BY AIR: To Canada and U.S.A., six months, $16

IN THIS ISSUE:

World Gliding Championships - - - 86
Snarler - - - - - - - 92
Nato Gets Down to It - 93
At the Races - - - - 95
Nato at Brussels - - - 96
49th Division in Britain - 98
Airline Operational Responsibility - - - 99
Mig-15 - - - - - - - 102

Happily Ever After?

PERHAPS it is a blessing that so many people want to air their views (and sometimes to grind axes) that the columns of Hansard and the daily Press are once again filled with talk of commercial aviation. At least it can be said that those in the best position to take action are showing an interest.

The recent pronouncements by Government and Opposition, preceded as they have been by much argument, manœuvring and negotiating, remind us of the typical romantic film, in which boy meets girl, major misunderstandings arise from minor incidents, boy loses girl, but both eventually reach their happy goal before the altar; after which, one is led to suppose, all their troubles are over. A similar blissful threshold is brought to mind when Mr. Lennox-Boyd states that we are "on the verge of a great air age," with a "very great field open to private operators." And for the Opposition, Mr. Beswick agrees there is "a huge opening for private operators in freight development."

Bearing in mind that Britain's lead in turbine-powered airliners is recognized everywhere, that Comets are already operating and selling abroad, and that Viscounts and Britannias are well on their way, are not our civil aviation troubles practically over? Alas, these happy circumstances offer no more guarantee of a calm and trouble-free future than do a ring and a blessing. For example, it is vital to the nation's economy and prestige that we should be able to play a major part in this great air age; yet, according to reports, there are in all only 270 British commercial aircraft registered, as compared with 1,400 in America, and plans for the next two years provide for only 90 more, as compared with 500 in the United States. The independent operators are clamouring for the chance to step into the huge untapped openings in freight transportation, but what with? They have only a few obsolete, though still useful, Yorks, one or two Hermes with strings attached, and the chance of a few other four-engined machines surplus to B.O.A.C.'s requirements. What chance have these against fleets of fast, modern, pressurized freighters such as DC-6s and Constellations?

Part of the blame for the current state of affairs is, of course, attributable to unavoidable rearmament commitments; but a large part is also the responsibility of the late Government. By stifling the independent operator in order to nurture the Corporations, they not only seriously handicapped the natural development of the country's air-transport industry (and in so doing greatly weakened the potential reserve strength of the merchant air service) but, as a direct result, so reduced the demand for most classes of transport aircraft that the manufacturing industry itself had no option but to tighten its belt—and this at a time when today's additional transport aircraft ought to have been building.

If the men at the top really believe—as we do—their own pronouncements that a great air age is opening, then, regardless of political persuasion, they ought to act on that belief and without delay give all the operators and manufacturers a chance to take their rightful place in world air commerce. We have no doubt that there is plenty of scope for all. The Corporations have reached a state of efficiency and strength which would enable them to withstand such competition as there might be from British independent operators as well as from foreign companies. The politically biased suggestion that Corporation employees might be forced out of work should the independent operators be freed could not be farther from the truth. An expanding industry would bring more opportunities for employment and competition for the services of capable men. To continue to hold back the independent operators and "hot-house" the State airlines is to reduce our own strength and play into the hands of foreign companies.

The immediate requirements would seem to be, in the first place, to exploit to the full our technical lead in civil jet aircraft—a very good start has been made; secondly, to give the private operators such freedom and guarantee of independence in the future that they can plan confidently ahead and obtain and invest private capital in badly needed new aircraft suitable for their specialized needs; and, thirdly, to set up a committee at the highest level (a combination, perhaps, of a Brabazon-type committee and that recently suggested by Lord Pakenham) to see that the production of outstanding British commercial aircraft is expedited, and, more particularly, to make sure that the next generation of civil aircraft *of all types* will be as good as and more numerous than those of today.

WORLD GLIDING CHAMPIONSHIPS

Part III: The Closing Stages and Final Placings: Philip Wills's Success

Philip Wills, the championship winner, and (right), F/L. Jack Forbes, close runner-up to the French pilot Pierre for second place.

THIS is the third and final instalment of our special correspondent's day-to-day reports on the progress of the international contest, in which, apart from Philip Wills's winning of the Championship, a notable success for Britain, was the high placing of the new Slingsby Sky sailplanes. During the period of the event a congress of OSTIV (International Scientific and Technical Organization for Soaring Flight) was held, and these proceedings will be reported in an early issue of this journal.

Cuatra Vientos, Madrid, July 9th.

THERE was even more high cloud today, with considerable haze, but the contest was on. A free distance flight had been given as the task and 54 took off, beginning at 12.30 p.m. Among them were Dick Johnson in the RJ5, repaired after a crash landing on the first day. Having missed two contest days Johnson was near the bottom of the list, and it seemed that nothing short of a flight to Africa could retrieve his fortunes. His effort was, however, a moderate one. Many pilots had again chosen the road toward Zaragoza, but most of them fell short of the town.

When the offical list of landing places was available it was seen that two pilots, Peddesen of Denmark in the single-seat Weihe, and Kahva of Finland in a two-seat Kranich, had covered the greatest distance, both landing 152 miles away. Wills's 147 miles gave him almost full points, but Pierre, who had landed after 108 miles, fell from the lead to second place. Three other Skys, flown respectively by Stephenson and Forbes from England and Cuadrado of the Argentine, landed together after 140 miles. Dick Johnson, well behind after breaking the RJ5 fuselage, did 118 miles.

The single-seater positions after four days were :—(1) Wills (G.B.), Sky, 3,579 points; (2) Pierre (Fr.), C.M., 3,337; (3) Forbes (G.B.), Sky, 3,318; (4) Ordelman (Holl.), Sky, 3,194; (5) Cuadrado (Arg.), Sky, 3,191; (6) Gehriger (Switz.), Weihe, 3,115; (7) Stephenson (G.B.), Sky, 2,819; (8) McCready (U.S.A.), 1-23, 2,769. Welch lay 11th with 2,596 points.

In the two-seater class the positions were :—(1) Juez (Spain), Kranich, 3,182; (2) Kahva (Finland), Kranich, 3,013; (3) Beuby (U.S.A.), Kranich, 2,994; (4) Hanna Reitsch (Ger.), Kranich III, 2,966.

Friday, July 11th.

The Thursday was another "rest day," and it was agreed that the Friday should be the fifth and last contest day. The long retrieves and hard work in the tremendous heat had taxed the stamina of all concerned and many were very glad to have the end in sight.

In the first four contest days there had been one goal flight task, two free distance flights and one race (or "speed dash" as the Americans call it). A great argument began over the last day's task—a race or a goal? Some pilots, realizing that nobody had yet exceeded the Gold "C" 300 kilometres, would have preferred a long flight. The organization could not lay on a race to anywhere farther than Monday's finishing-line, so it was finally agreed to repeat the race to Torre Saviñan, 77 miles away along the same old road to the north-east.

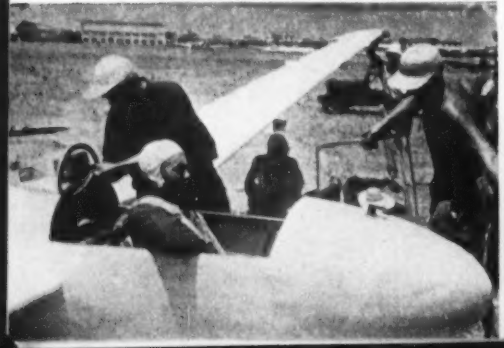
At noon on the Friday there was a light southerly breeze but an oven-like atmosphere—101 deg F in the shade. On the light sandy airfield the crews, pilots and your correspondent were having hallucinations about iced drinks and the green fields of England. There was no cloud anywhere except over the hills to the N.W., and already there a gigantic anvil cloud was filling the upper sky and threatened to cut off the sun along the route unless everyone got away quickly. One hour after take-off, cu-nim clouds had invaded the plain, rain was falling nearby and the surface wind swung through 180 deg, although aloft it remained southerly. These conditions were unpleasantly reminiscent of the first day of the competition, when Foster and Lasch lost their aircraft in the storm.

It appeared, however, from the radio transmissions being received in Mrs. Ann Douglas' car that some at least, of the British team were enjoying themselves inside these large clouds. Wills and Forbes could be heard talking to their ground crews from 20,000 ft. Wills—who, by finishing the course at even a moderate speed, must win the Championship—climbed in the cloud until he had passed the previous best British height for sailplanes and reached 23,500 ft. Although still climbing well, equipped with oxygen and with barographs running, he then broke off the climb and dived toward the finishing line. Forbes, having set off expecting to race at a low altitude, was without oxygen or barograph. He was heard giving a running commentary on his attempts to get out of the cloud, and was at one time spinning with the air-brakes of his Sky iced in the extended position.

Those on the ground were anxious lest Wills and Forbes should be unable to find the finishing line after this spell of blind flying—but they reached it in 1 hr 29 min and 1 hr 31 min respectively. Lorne Welch also finished the course, but Geoffrey Stephenson, after making good progress, was forced down a few miles short of the finish; awaiting his trailer, he had to watch other sailplanes whistling home about a thousand feet overhead.

The outstanding performance of the whole contest was the completion of the 77 miles by Dick Johnson (U.S.A.), the world distance-record holder, in 1 hr 8 min. The weather conditions had

(Left) Gerard Pierre, runner-up to Wills, ready to take off in his Castel-Mauboussin on the last day of the contest. (Centre) The host—the Duke of Almodóvar del Rio, president of the Royal Spanish Aero Club. (Right) Geoffrey Stephenson and Ann Douglas, the British captain, find shade.



(Left) Helli Lasch (South Africa) and Mrs. Lasch keep the cockpit cool while awaiting their tug. (Centre) Dr. R. S. Scorer, the British meteorologist, talks with Joachim Küttner (U.S.A.) who recently flew a glider 340 miles in four hours in standing waves. (Right) A characteristic snap of Wills.

not favoured high speeds and only half the competitors completed the course; nevertheless, Johnson, leading all other pilots by 10 m.p.h., demonstrated the advantage of a very-high-performance sailplane.

Calculations now showed that the final positions in the 1952 World Gliding Championships were as given in the tables at the foot of this column.

The Championship is awarded to the individual pilot scoring most marks. Everone realized, however, that the British effort had been a great example of team work and congratulations were showered on all the British for Wills's victory. Mr. F. N. Slingsby, whose seven Skys had ended up within the first fourteen places, received his share in the congratulations—and was heard to say, modestly, that "to have had seven Skys at the top wouldn't look quite right."

Thirty-two of the U.K. contingent held a celebration dinner that night and felt extremely proud that, in motorless as well as in powered flight, Britain was in a leading position.

Now that Madrid is again 1,000 miles away (these concluding observations are being written in England) it is easier to see the struggle in perspective. What impressions remain most clearly in focus?

The quiet confidence of the British team, which was due so much to the knowledge that everything possible had been planned before they left England; the best gliders obtainable (lent by F. N. Slingsby and John Furlong); first-class towing vehicles (lent by the Standard Motor Company); the invaluable Pye radios fitted to all gliders and cars; all these and many other gifts and loans had been thoroughly tested in England before the contest. The pilots and crews arrived early in Madrid and practised seriously—almost the only team to do so. The team's meteorological briefing was in the capable hands of Dr. R. Scorer, who was attending the Ostiv conference. (Even if, as Scorer alleged, much had to be guessed, how much better for the morale is the guess of the met. man you know !)

FINAL PLACINGS

Single-seaters

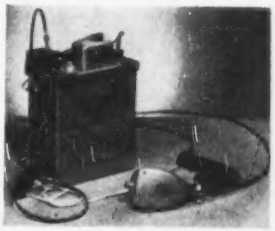
Place	Pilot and Nationality	Sailplane	Points
1	Wills (G.B.)	Sky	4,333
2	Pierre (Fr.)	C.M.	4,048
3	Forbes (G.B.)	Sky	4,043
4	Cuadrado (Arg.)	Sky	3,853
5	Gehriger (Switz.)	Weihe	3,752
6	McCready (U.S.A.)	1-23	3,569
7	Ordelmann (Holland)	Sky	3,432
8	Kuhn (Switzerland)	Air 100	3,347
9	Welch (G.B.)	Sky	3,138
10	Ara (Spain)	Weihe	3,120
11	Stephenson (G.B.)	Sky	3,115
12	Haase (Germany)	Condor IV	3,006

Points are out of a possible 5,000. Thirty-nine competitors were listed in the full results.

Two-seaters

Place	Pilot and Nationality	Sailplane	Points
1	Juez (Spain)	Kranich II	4,164
2	Fröwein (Germany)	Kranich III	3,612
3	Hanna Reitsch (Germany)	Kranich III	3,426
4	Mantelli (Italy)	Canguro	3,214
5	Kahva (Finland)	Kranich II	3,146
6	Beuby (U.S.A.)	Kranich II	3,108

There were no British two-seater entries. Seventeen competitors were listed.



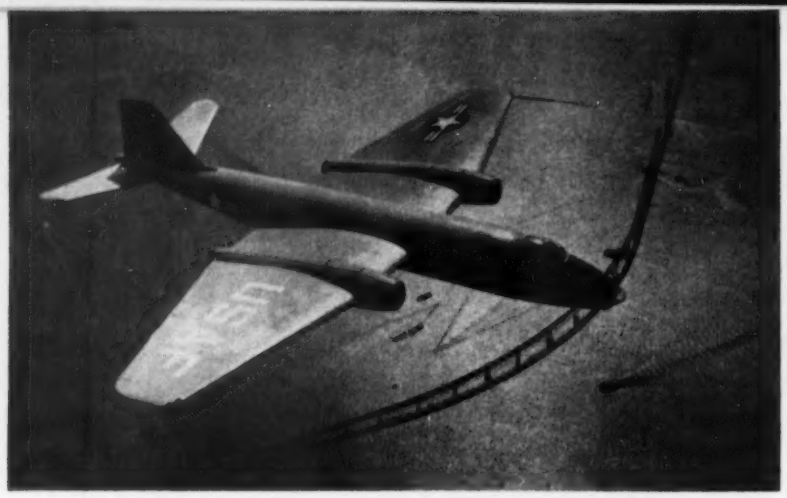
The remarkable little Pye 0.1 Watt transmitter-receiver, developed from walkie-talkie equipment, as used in the British and Argentinian gliders. Weight is 8 lb. including batteries and handset, and range can exceed 50 miles. Frequency range is 60-100 mc/s. On the right, Mrs. Wills and Mrs. Stephenson are seen in communication with airborne husbands—a sobering thought for all of us.

The captaincy of the team was again brilliantly managed by Ann Douglas. The tiresome meetings between the team leaders; the representations to the organization (who spoke little but Spanish); the despatching of the ground crews from Madrid before the pilots had taken off (to hasten retrieves); final advice; drinks and wing-tip holding for the pilots; the vigils at the telephone—all these she appeared to enjoy, even at 100 deg F.

Luck is always a factor in gliding. We had our share of bad luck —Foster's early retirement due to freak weather, the apparent failure of Wills's barograph to record his record height—but the presence of all four finishers in the first eleven means that our victory was a substantial one.

The other competitors from the British Commonwealth, Waghorn and Hoinville of Australia, Lasch of South Africa and Pow, Boudreault and Jeffery of Canada were all flying gliders borrowed from Spain. They also relied largely on Spanish crews, cars and trailers. In these conditions it is not surprising that their positions were lowly. By contrast, the U.S.A. team brought four single-seaters with them and borrowed only a two-seater. The latter, flown by Beuby with the world No. 3 Diamond "C" holder, Shelley Charles, as passenger, did well. But the single-seater performances were poor. Johnson's RJ5 is beautifully streamlined but is not robust enough to face landings in Spain and, as a result, its pilot had to stand down on two contest days.

The Swedes, who did so well in 1948 and 1950, finished low down in the list, and so, with the exception of Pierre, did the French. Germany brought five new two-seaters to Madrid. One, flown by Haase with a water ballast tank in the second seat, competed as a single-seater. The other four did well in the two-seater class. It is clear that, although gliding has only just restarted in Germany, the Germans will soon again be in the first rank. A.H.Y.



SOUND STRUCTURES: Wearing U.S.A.F. insignia, an English-Electric-built Canberra B.2 flies over the almost-completed 4¼-mile-long Chesapeake Bay bridge. Powered with Curtiss-Wright J-65 turbojets (Armstrong Siddeley Sapphires), Canberras are being built at the Glenn Martin Baltimore works nearby, in a night-intruder version with the U.S.A.F. designation B-57A.

FROM ALL QUARTERS

Transatlantic Helicopters

BY the time this issue of *Flight* appears, two Sikorsky S-55 helicopters of the U.S.A.F. should have completed the first transatlantic flight by rotary-wing aircraft. The helicopters, flown by Capt. Vincent McGovern and Lt. Harold Moore, with Capts. Jeffers and Gombrick as co-pilots, left the manufacturers' airfield at East Hartford, Connecticut, on July 14th and flew to Westover Air Force Base, Mass. The following day they continued to Presque Isle, Maine, and on July 17th set off for Goose Bay, making a stop for refuelling at Tor Bay, Newfoundland, after encountering adverse winds. The remaining stops on the transatlantic route were Greenland, Iceland, Stornaway (if necessary) and Prestwick.

From Prestwick they were to fly, *via* Manston, to Wiesbaden, Germany, for delivery to the 9th Air Rescue Squadron of the U.S.A.F.

The S-55, designated H-19 by the U.S.A.F., is powered by a single P. and W. R-1340 radial engine of 600 h.p. The type is being produced under licence in Britain by Westland Aircraft, Ltd.

N.F.11s for Denmark

A REPORT from Copenhagen, says that the first aircraft of a squadron of Armstrong Whitworth (Gloster) Meteor N.F.11s which are to be supplied to Denmark under NATO arrangements are expected to arrive early in November. The squadron is to operate from Aalborg, Jutland.

Sabre Simulators

IT was announced last Monday that a contract for ten Sabre flight-simulators has been placed by the Canadian Government with Redifon, Ltd., of London, S.W.18. The value of the order, gained in the face of strong U.S. competition, is over £1 million.

Lord Hives on Air Rearmament

AT the 45th annual general meeting of Rolls-Royce, Ltd., held at Derby last Tuesday, Lord Hives (chairman) was expected to announce a record consolidated net profit for 1951 amounting to £1,600,202 before taxation (1950, £1,166,122).

The chairman's statement, issued in advance to stockholders, pointed out that the plant and facilities in course of being provided by the Government made very little contribution to the 1951 turnover; it was probable, indeed, that this work would not be substantially reflected before 1953. Nevertheless, there had been a considerable increase in turnover, and this was apparent in practically all the company's activities; the chief source was the increased and more up-to-date production facilities already available. Altogether, over £4 million has been spent since the end of the war; in the majority of cases, the decision to order new equipment had been taken independently of the present rearmament programme.

Saying it was accepted that the excess profits made on purely rearmament work might be subjected to special taxation, the chairman's statement continued: "We do submit, however, that it should not be overlooked that the present rearmament programme, which is planned to a terrifying extent throughout all the free nations of the world, can only be regarded as a gigantic stockpiling operation in any circumstances short of war. We all hope and pray that it will remain so.

"Your Company has a national responsibility in the defence programme, and we have an obligation to carry out the wishes of the Government, even to the extent of sacrifice of commercial enterprise, but it is necessary to realize that part of that sacrifice is represented by the fact that the present level of activity must be at the expense of future orders. After the last war the liquidation of stocks of aircraft engines was tremendously helped by the advent of the gas turbine, because reciprocating engines quickly became obsolete for many forms of aircraft. The same drastic change of prime mover cannot be expected to happen again for some time, and as the stockpile of existing equipment is allowed to grow, so for future business shall we have to rely more than ever on the superior quality of Rolls-Royce engines.

"The essential task at the moment is the re-equipment of the Royal Air Force, but in this it is to be sadly regretted that orders were not placed in time for various types of British aircraft, with the result that the Royal Air Force is being supplied with American equipment. This is not only a matter which concerns the pride of the British Industry: it is only to be expected that our allies will adopt equipment similar to the Royal Air Force, and so once again our Industry will be severely handicapped in selling its wares abroad in very much the same way as it was in selling transport aircraft after the last war."

The chairman then went on to review the work of the aero engine division, listing the numerous achievements and developments that have also been recorded week by week in our own columns.

A final dividend of 10 per cent was recommended, making 15 per cent for the year.

SIGNAL OCCASION: *Delegates to the recent British Commonwealth Signals Officers Conference were entertained to dinner at Grosvenor House, London, by Plessey International, Ltd. Here Mr. B. G. W. Attwood (director of the firm and of the Plessey Co., Ltd.) is seen in conversation with A.V-M. Dalton Morris, Assistant Chief of the Air Staff (Signals).*

Champion and Veteran

ON his return from Spain after his victory in the World Gliding Championships—reported in the preceding pages—Philip Wills said that, given the chance, the British sailplane could now occupy a position "on top of the world," like that of the Comet. He went on to say that the British success had been made possible by the help of Viscount Kemsley, president of the British Gliding Association, who had launched the appeal for funds, by those who supported the appeal, and by the Kemsley Flying Trust.

In a personal note on Philip Wills, "Atticus" remarks in the *Sunday Times* that, now 45 years of age, he was flying sailplanes before some of today's glider pilots were born. "If this were to be the end of his gliding career (and I much doubt that)," the columnist continues, "it would be particularly gratifying to him in that it enabled him to launch on its career the best sailplane, the Sky, that Britain has ever produced. He must have spent thousands of pounds on sailplanes and on practising his chosen sport. Those who recall how in his own sailplane he flew across the Channel to test our early radar defences will rejoice that this Old Harrovian enthusiast should have reached the height of a glider pilot's ambition just as the years might be expected to put a brake on his powers."

Britannia at Farnborough

THE Bristol contribution to the S.B.A.C. show this year should go a long way toward satisfying the interest of visitors. In addition to the well-established 171 Sycamore, the twin-engined, twin-rotor 173 helicopter will perform in public for the first time, and work is going forward at high pressure in order to ensure that the 175 Britannia will be able to demonstrate some of its grace and performance at the show. On the score of performance, something outstanding can be expected of the Olympus-engined Canberra, and interest in this powerful yet economical turbojet will be satisfied at close range by the engine exhibited on the Company's stand.

We understand, also, that the final coupled Proteus 2 power unit will be delivered to Saunders-Roe by the end of this month for installation in the Princess. When the power installation for the boat is complete, she will take the water for the first time and, providing no last-minute snags appear, and the requisite preliminary number of flying hours can be put in, it is possible that the giant craft may be able to appear at Farnborough.

80 Octane Withdrawn

OWNERS and operators of light aircraft of all types will find, if they have not already done so, that the 80 octane petrol which they have been accustomed to using is no longer available at airfields. This state of affairs is apparently one more repercussion of the Abadan affair and the American fuel strike. In place of 80 clear, 73 octane (a fraction better than Pool) is to be issued at the same price. Unfortunately, this does not suit all engines which have been running on 80 octane, and its value can only be raised by mixing with high-octane leaded fuel, which is also unsuitable for some engines.

The oil companies have issued some rather guarded information and instructions, the meat of which follows. The several flying clubs which boast only one fuel pump seem to be faced with something of a dilemma.

Owing to the present difficulty in the world supplies of aviation gasoline, state the oil companies, importations into this country of 80 octane lead-free gasoline have been discontinued, and this grade was withdrawn from the market on July 1st, 1952. Instead, 73 octane unleaded aviation gasoline is being marketed and, generally, this will replace the 80 clear.

SWITCHED OFF: Among the targets of U.N. fighter-bombers which took part in the stepped-up series of raids against North Korean key-points early this month were a number of hydro-electric power stations. This low-level oblique photograph, taken from an aircraft of the 67th Tactical Reconnaissance Wing, shows the results of one of these attacks. The generator house was reduced to a shell, and severe damage was done to the penstocks (the pipes which bring the water down the mountainside) on the left and to the transformer-park on the right.

An unleaded fuel is essential for many types of engines, such as the de Havilland Gipsy Major I, Six I and Minor. Additionally, the following engines may be run on 73 octane, although they are cleared by their respective manufacturers to operate on gasoline containing not more than 4.0 mls. T.E.L. per I.G.: de Havilland Gipsy Major IF, Six IF and Queen III; Cirrus Minor I, Minor II and Major II. This requirement can be met by 73 octane.

Other types of engines require a fuel with a minimum octane rating of 77. For example: de Havilland Gipsy Majors $1C_2$, 1D, II, IIA, V, VII, 10-1, 10-3, 10-4, and 30, Gipsy Six II, Gipsy Queens I, II, 33 and 34, and Cirrus Major III.

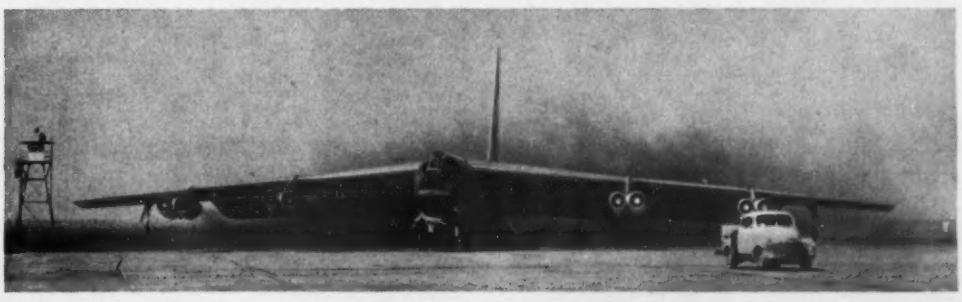
While, normally, 100/130 grade could be used for these engines, the present lead content of this grade is understood to be in excess of the maximum stipulated by the engine makers. In order to meet the requirement, a mixture of 100/130 grade and 73 octane can be made available. This mixture normally gives a minimum rating of 80 octane, with a lead content within the limits stipulated.

Where this mixture is required and is not available ready mixed, a fifty/fifty mixture of 100/130 grade and 73 octane should be used, but it is essential to put the 100/130 grade in first.

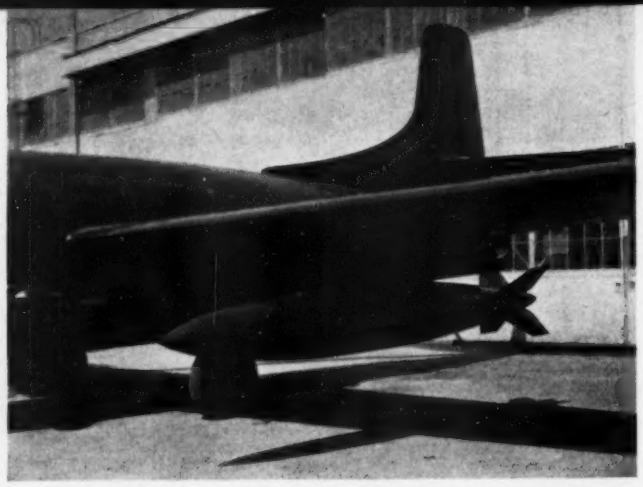
The South Coast Race

FORTY-SIX entries have been received for the *Daily Express* Trophy Race, to be flown over a slightly modified version of the usual South Coast course on Saturday week, August 2nd, for the trophy and over £2,000 worth of cash prizes. Details will appear in *Flight* next week.

LEVIATHAN: With a background of jet smoke, and with the leading four wheels of the eight-wheel landing-gear turned to port to follow the taxi-track car, the great Boeing YB-52 makes an awe-inspiring picture on its arrival at Larson A.F.B. after its maiden flight from its birthplace at Seattle.



HERE AND THERE



THE BIG CIGAR: Designated Aero X-1A, this 2,000 lb bomb designed by Douglas engineers—and seen here on an F3D Skyknight—is claimed to give a 50 m.p.h. speed increase in an aircraft carrying three of the new type instead of three of more orthodox shape. Super-streamlined bombs, of course, are no novelty, as those who remember the R.A.F. concrete-piercing missiles will be aware.

S.B.A.C.'s Royal Guest

AMONG distinguished visitors to the S.B.A.C. Farnborough Show in September will be H.R.H. the Duke of Edinburgh.

Vickers' Directorships

APPOINTMENT of additional members of their board is announced by Vickers-Armstrongs, Ltd.; the executives concerned are Mr. T. Gammon, O.B.E., M.I.Mech.E., manager of the Weybridge Works, and Mr. W. D. Opher, M.I.Mech.E., works superintendent at Crayford.

Skyrocket's 1,200 m.p.h. Plus

AN air-display announcer's incautious disclosure that a Douglas D-558-2 Skyrocket had flown at 1,300 m.p.h. was confirmed a few days later—on July 16th—by Mr. Kimball, U.S. Navy Secretary, who, however, gave the speed as 1,238 m.p.h. The pilot was Major "Bill" Bridgeman, and the speed was attained during one of the flights which he made last August, when, launched from a B-29, he reached a height of 79,494ft (a figure also now confirmed by Mr. Kimball). N.A.C.A. officials disclosed that the Skyrocket carried 500 lb of refrigeration equipment to counter skin-friction heating. Comprehensive details of the supersonic research programme conducted with the D-558-2 were published in *Flight* for May 9th, 1952.

A Book on Guided Missiles

LAST week we published an article on guided missiles, an introduction to a book on the subject by Kenneth W. Gatland. Now we can announce the publication of the book itself; entitled *Development of the Guided Missile*, and illustrated with 45 photographs and diagrams, it is based on Mr. Gatland's notable series of articles, now revised and brought up to date, which appeared in *Flight* last summer. The ground covered is wide, ranging from small air-to-air missiles to the "space-satellite vehicles" of the future. With a foreword by Air Chief Marshal Sir Alec Coryton, of the Bristol Aeroplane Co.—who was until recently Chief Executive (Guided Weapons), Ministry of Supply—the book is published for *Flight* by Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1; its price is 10s 6d (postage, 5d).

No Skegness Display

THE directors of Skegness Airport, Ltd., state that, owing to pressure of work, they have found it necessary to cancel this year's Skegness air display. The event was fixed for August 9th-10th.

Jet Pioneer's Plans

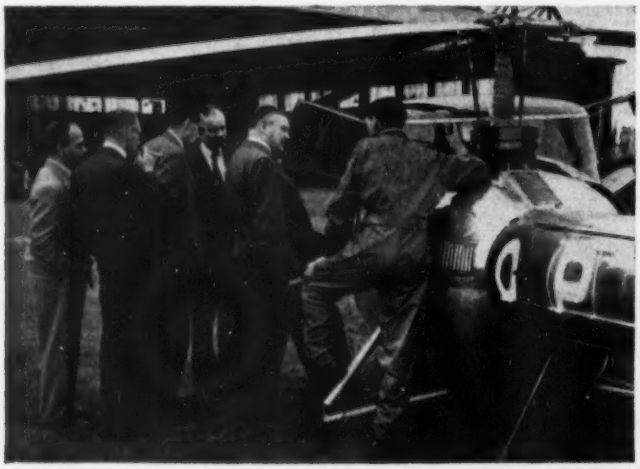
SIR FRANK WHITTLE announced on July 15th that he was relinquishing his honorary post—which he has held since 1948—of technical adviser on jet development to B.O.A.C. It is said that he has not yet made a final decision on whether to accept the research post in America recently offered to him; meanwhile, he is said to be retiring to Devonshire in order to write his autobiography. Sir Frank's decision to leave the B.O.A.C. post was referred to during last week's air-transport debate in the Commons, Mr. Dudley Williams (Con., Exeter) expressing himself as unable to believe that B.O.A.C.'s board felt that "jet development had reached such a pitch of perfection," that Sir Frank's assistance was no longer required.

Mercy Missions

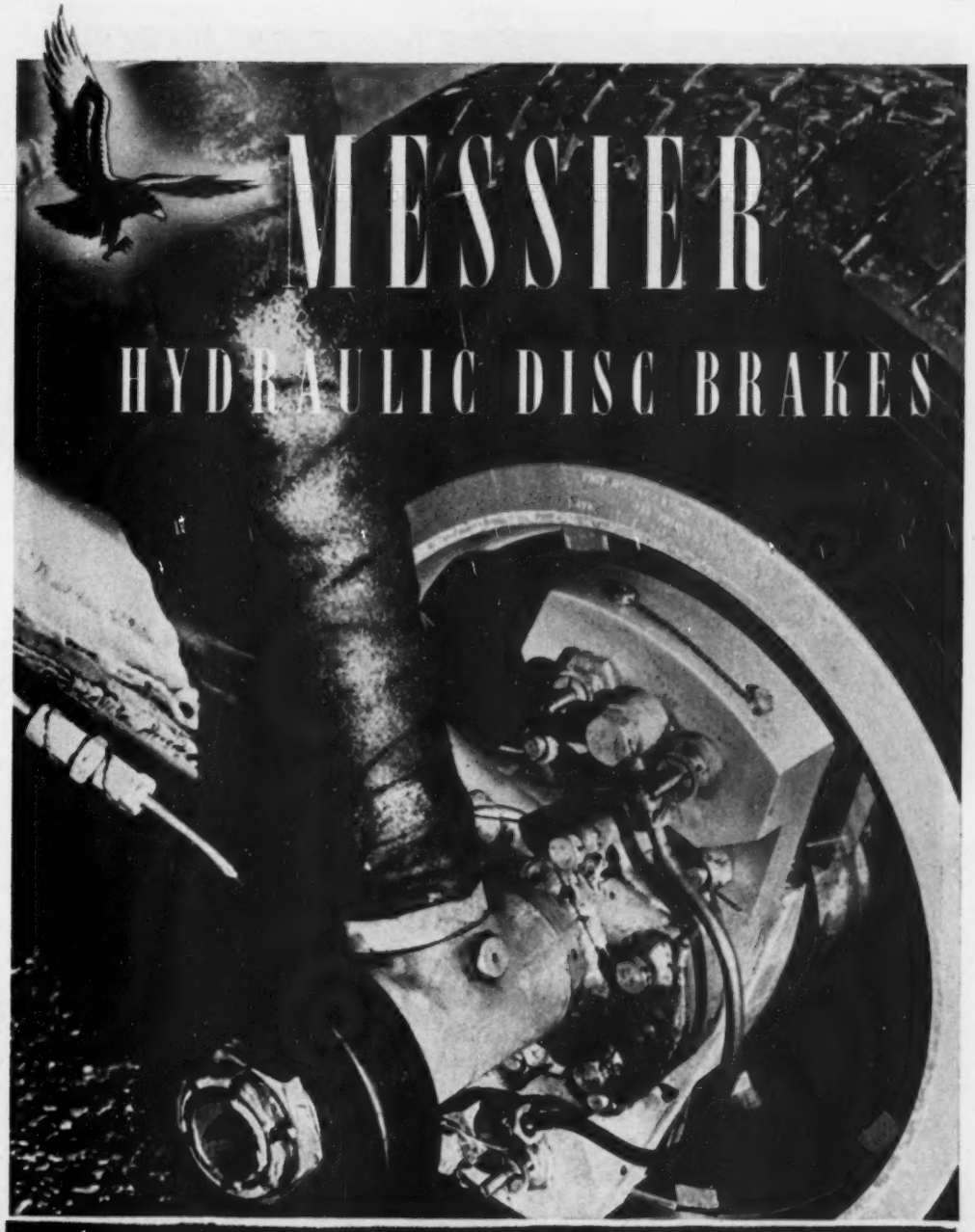
PILOTING his Auster VH-KBH, Dr. Geoffrey Young, of the Australian Flying Doctor Service—an Englishman with 22 years' flying experience—played a remarkable part in the rescue of victims of the disastrous Lachlan River floods last month. He made a mountainside landing in reply to a distress signal from 98 marooned people, flew out again with a seriously ill year-old baby, then returned to the mountainside with food supplies. During these flights he saw another crowd of people, who were in real danger from the advancing flood. Returning, he landed in a paddock and then carried to safety, in a series of 10-mile flights, 17 women and children. With another light-aircraft pilot, Tim Meagher, he also flew-in some 2,000 lb of food during the flood period. Later, by radio from the air, he directed club aircraft and an R.A.A.F. helicopter in further rescue work.

Kilbride Progress

CONSTRUCTION of the test-beds has started on the site of the new Rolls-Royce engine factory at East Kilbride, near Glasgow; the contract, valued at £700,000, has been awarded to two Glasgow firms. The test buildings are located one mile to



SKEETER ON SHOW: Not very much has been heard during recent months of the Skeeter, but development by the helicopter division of Saunders-Roe has continued steadily under M.o.S. contract for Service use. Here Lord Douglas, of Kirtleside, chairman of B.E.A., is seen inspecting one during a recent visit to Eastleigh. Left to right: Mr. Brennan, deputy chief designer; Mr. Walter Browning, director and general manager; Capt. E. D. Clarke, managing director; Dr. G. S. Hislop, of B.E.A. research; Lord Douglas; and Mr. Jeffery, test pilot.

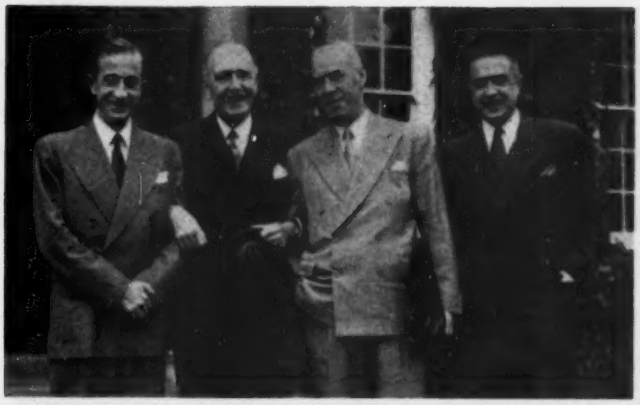


The new Messier Hydraulic Disc Brake—flight tested on several types of aircraft, and laboratory tested on British Messier's comprehensive brake testing equipment.

BRITISH MESSIER LTD. GLOUCESTER

D

Cirrus wins again
KING'S CUP — 1st
MR. C. GREGORY'S "TAYLORCRAFT" PLUS "D"
Powered by a CIRRUS MINOR I
NORTON GRIFFITHS TROPHY — 1st
MR. W. P. BOWLES'S "MESSENGER"
Powered by a CIRRUS MAJOR III
and 3rd
MR. R. MATTHEWS-NAPER'S "MESSENGER"
also powered by a CIRRUS MAJOR III
subject to official confirmation



CORDIAL ENTENTE: A recent visitor to the Bristol works was the famous French constructor, M. Louis Breguet. In this cheerful group outside the offices at Filton are (left to right) M. Morel, Bristol's Paris agent; M. Breguet; Capt. K. J. G. Bartlett, Bristol sales director; and M. Brocard, Breguet chief designer.

HERE AND THERE . . .

the west of the boundary of the new town to ensure that the noise does not trouble local residents; but it is claimed that, in any case, the design of the test-beds is such that very little noise will, in fact, be heard. Construction work is being supervised by Scottish Industrial Estates, Ltd., and the town's Development Corporation, who are responsible for the roads and services.

Apple-jack

SHORTLY after a B.E.A. Pionair had taken off from Northolt for Glasgow last week, it was found that a hydraulic leak was preventing operation of the undercarriage. Capt. Hugh Morgan, the pilot, at once sought an emergency supply of fluid—forthcoming, it is reported, from the galley, in the shape of four bottles of apple juice and one of water. The system was successfully topped-up while the aircraft orbited London Airport, where a landing was made nearly an hour later. The 29 passengers were then returned to Northolt and left for Glasgow in a replacement aircraft.

". . . low landing-speed, supersonic, and it just fits a corner of the harem."

Strength to Strength

A CANADIAN Government White Paper on defence measures, issued last week, forecasts the formation of a new Sabre squadron every two months. These units are for a 12-squadron division in Europe; three are already in this country.

IN BRIEF

AT the invitation of its president, Mr. Robert Blackburn, the Aircraft Golfing Society recently played its annual match against Blackburn and General Aircraft, Ltd.; the result was a tie, each team gaining six points.

* * *

At the annual general meeting of the R.F.D. Co., Ltd., to be held on August 15th, a dividend of 10 per cent, less tax at 9s. 6d., will be recommended in respect of the year 1951.

* * *

The London sales office and the railway signalling department of Nife Batteries, Redditch, Worcs, have been transferred from 50, Grosvenor Gardens, London, S.W.1, to new premises at 53, Victoria Street, S.W.1. (Abbey 1412).

* * *

Mr. A. G. Salisbury is about to retire from his post with the British Thomson-Houston Co., after some 44 years' service. A specialist in fractional h.p. motor development, he also did much pioneer design work on aircraft magnetos during World War I.

* * *

Employment for British technicians on dollar-earning work in the Ferguson factories will result from the award of a $2,500,000 contract by the United States Government to Thorn Electrical Industries, Ltd. The equipment—radio transmitters and receivers—will be used in NATO aircraft.

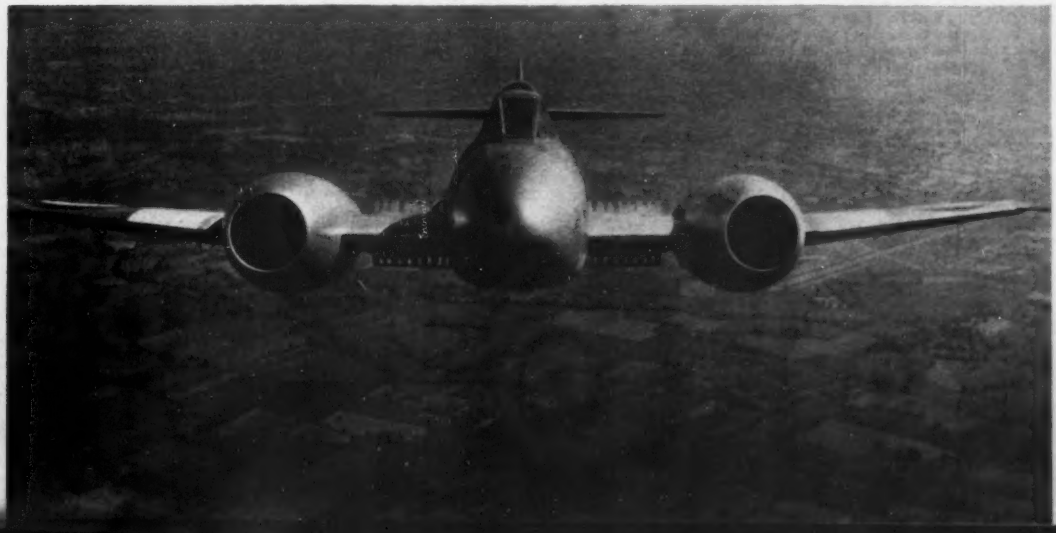
* * *

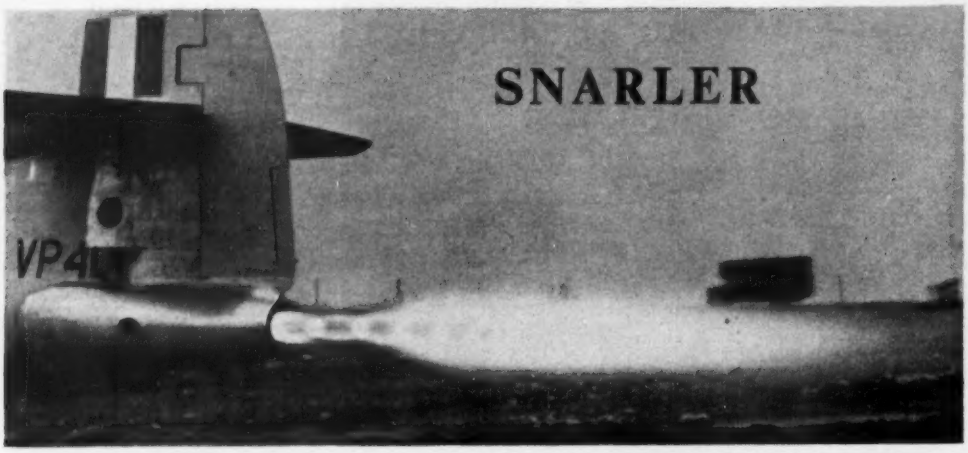
C. C. Wakefield and Co., Ltd. (Castrol oil), announce the appointment of Mr. L. G. Packham as overseas general manager. He succeeds Mr. W. F. List, who is now an assistant managing director. Mr. Packham, who has been with the company for 27 years, was previously manager of its overseas division (branches).

* * *

The directors of British Insulated Callender's Cables, Ltd., announce that they have accepted with regret the resignation of their deputy chairman, Mr. P. V. Hunter, C.B.E., Hon. M.I.E.E. Mr. Hunter, who will shortly enter his 70th year, will continue as a non-executive director and will remain on the boards of several of the subsidiary companies, where his long experience will be of special value.

FULL-FACE PORTRAIT: Gloster's chief photographer Russell Adams has once again produced a striking air-to-air study of the Meteor. In this case however, the action is less dramatic, for the aircraft is a trainer Mk 7 gently keeping station behind the photographic aircraft





The burning gases leave the Snarler at something like three times sonic speed, and shock-wave formations can be seen as coloured flame cones

Armstrong Siddeley's Oxygen/Water-methanol Rocket Motor: Handling Liquid Oxygen

THE existence of the Armstrong Siddeley Snarler liquid-fuel "hot" rocket-motor of 2,000 lb thrust has been public knowledge for only about a year, but work was started on this and other rocket projects six years ago. The three principal dates in the Snarler's development were: Work started, autumn, 1947; special-category flight-test completed, May 1950; unit tested in flight in Hawker P.1072, November 20th, 1950.

When discussions first took place, they centred, as might be expected, on the choice of fuel, and more particularly of oxidant; should nitric acid, hydrogen peroxide or liquid oxygen be selected? The company chose liquid oxygen with water-methanol, and as the months have passed it has never regretted its choice. For various reasons, particularly those concerned with logistics, the use of methanol is expected to be abandoned in favour of kerosine, or, for some rocket motors, perhaps ordinary M.T. petrol. The use of aircraft gas turbines will require kerosine to be available on all airfields in large quantities, so provision of this same fuel for rocket motors would not complicate matters. A similar argument applies to "pool" petrol.

A rocket motor such as the Snarler is relatively simple, consisting basically of the combustion chamber; the propellant pumps; a number of small control and safety devices, the principal purpose of which is to operate valves; and, of course, tanks for the two propellants. Power for the pumps may be provided by drives from a conventional engine in the aircraft, or the rocket motor can be made to produce its own power and so be self-contained.

From the start the Snarler has been developed as an aero engine—good handling, reliability and safety being always in mind. As a result, this comparatively small unit, which weighs only a few hundred pounds, is now controlled by two electric switches, one to light up and bring in one-third thrust, the other to select full thrust. Normally a pilot would not start with full thrust selected, but, should he do so by mistake, no harm would be done, for the unit lights up at one-third thrust in any case, and then almost instantaneously increases to the full 2,000 lb. The lighting-up process takes only a second or two and the change-over to full thrust no more than half a second. The motor may be switched on or off as often as the pilot wishes, and will run so long as fuel is supplied. Duration is, in fact, purely a matter of fuel capacity in any given aircraft.

When the starting switch is moved to "on" the sequence of operations which follows is purely automatic. The fuel and liquid oxygen pumps begin to operate. Both pumps prime, and the igniter valves open automatically. A high-intensity spark plug ignites the fuel, and rate of fuel delivery is related to chamber pressure—hence the automatic start on one-third thrust before full thrust can be obtained. One action triggers the next.

Great emphasis is placed upon safety, and devices are included in the Snarler to shut it down in the event of malfunctioning. It is particularly important to avoid an accumulation of fuels, which might produce an explosive mixture and overload the combustion chamber. For this reason equipment is provided to make it impossible for propellants to enter the combustion chamber before the igniter is fired. Should any interruption occur in the supply of propellants to the combustion chamber, or if any component ceases to function correctly, the rocket is automatically shut down.

Unlike piston engines, but in a somewhat similar manner to gas turbines, rocket motors are likely to be easier to design in the bigger sizes, and as much as four times the thrust delivered by the Snarler could be obtained from a unit of similar overall dimensions and less than twice the weight. Thrust developed is largely a matter of fuel-pump capacity. Specific consumption for hot rockets is of the order of 200 (i.e. 200 lb thrust per 1 lb of fuel per second).

The Snarler has flown in the tail of the specially adapted Hawker P.1072 fighter with Rolls-Royce Nene turbojet. The pilots were the late T.S. ("Wimpy") Wade and Neville Duke. The tests must have been of a preliminary nature because the P.1072 was not designed for flight at the speeds and altitudes foreseen for rocket-powered types and required to give comprehensive test results.

The noise of the Snarler running at even one-third thrust is shattering; one cannot stand nearby without ear protectors, and even then it is painful to the ear drums. Flame is visible for from 6 to 10ft behind the nozzle.

It should be noted that a liquid-fuel rocket of Snarler type maintains a steady maximum thrust output, whereas turbojets do not maintain their static sea-level thrust as they get higher—far from it. Thus, 2,000 lb thrust can be expected to give a very considerable increase in climb performance. As an example we may recall the Me 263 which, with a take-off weight of 11,650 lb and rocket thrust of 4,400 lb from a bi-fuel H.W.K.109.509, (but having no turbojet in addition) had an initial climb of 11,800ft/min and a climb at 32,800ft of 33,500ft/min.

If kerosine is later adopted as the fuel for some rockets a small increase in specific impulse will result; on the other hand, cooling problems for the combustion chamber may arise. Whereas water-methanol is a very good coolant for circulation around the combustion chamber (prior to entry into the chamber) kerosine is one of the worst. Additionally, the flame temperature with kerosine as fuel is appreciably higher.

During operation the combustion-chamber pressure must be kept above a certain minimum or specific consumption falls off, but above this minimum figure the rocket motors are not very sensitive to chamber pressure. At high altitudes the reduced atmospheric pressure is advantageous. Minimum chamber pressure is thus determined to some extent by the requirements for good specific consumption at the lower thrust settings.

In order to satisfy our curiosity, Armstrong Siddeley's test section at Ansty, Coventry, recently afforded us an opportunity to play with a bucket of liquid oxygen. As used for rocket motors it is an attractive-looking blue liquid and, having a normal

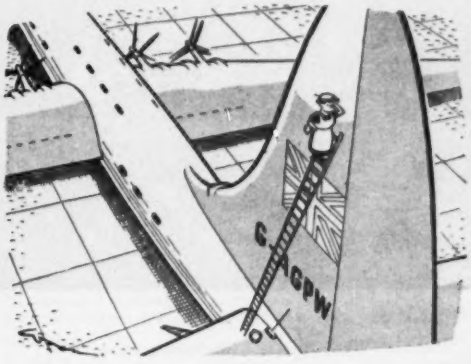
Little Drops of Water

BY BERNARD HOLLOWOOD

AIRCRAFT can and sometimes do go rusty. Yes, just like that. One minute an aircraft is as bright and shiny as a new farthing, and some time later it's revealing unmistakable signs of corrosion.

Let that happen and you're simply *asking* for trouble.

Modern aircraft are constructed as far as possible from corrosion-resisting steels and light alloys, but even these when they get together in the presence of water are not entirely immune from attack, and the war against corrosion must be waged relentlessly and without surcease, if you follow me.



Much better than spit-and-polish for this purpose are the corrosion-preventive compounds known as corrosion preventives or corrosion-preventive compounds, which are based on petroleum and are therefore made by the petroleum industry. What are they? Briefly, they are petroleum oils compounded with dispersant soaps and various chemicals.

The oil-soap combine does a remarkably neat job on water: it emulsifies it. This means, I think, that the H_2O (which is, of course, simply aching to start up some rust somewhere) is first atomised or broken into minute droplets and then snugly wrapped in a protective film of oil. The tiny droplets are then quite harmless since they are denied contact with the metal. My guess is that they go to sleep dreaming of the nasty men in the "Esso" laboratories.

Various chemicals, did I say? Yes, special agents charged with the task of taking the sting out of any acids and similar corrosive materials that may be lurking in the water.

So these corrosion preventives do their work by screening the metal from the water and by neutralising any acids it may contain. That's the drill.

Now these products of the "Esso" organisation come in a wide variety of styles and numerous viscosities. There's an extremely thin little oil suitable for protecting delicate instruments; there's a handy engine oil that will protect and lubricate almost indefinitely; there are

hard-drying compounds that will protect the external parts of engines and airframes with a semi-permanent film (it survives months of handling); and there are many others.

The complete set of them does a very useful job: they play a big part in reducing airline operating costs, and they help to keep our air forces at the ready.

And need I tell you that one section of the Esso Research Centre is devoted to the improvement of these corrosion preventives? It is staffed by the rust-and-acid squad, the boys those tiny droplets of water are apt to dream unpleasant dreams about.

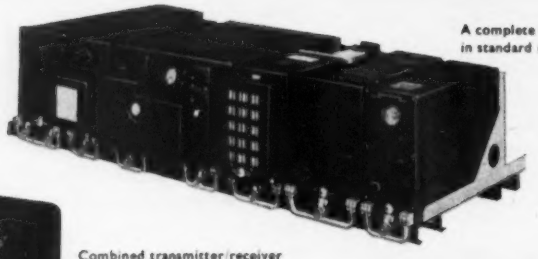
And need I remind you, too, that—

It pays to say

ESSO

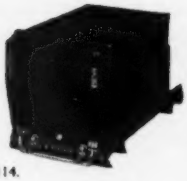
FOR ALL PETROLEUM PRODUCTS

ESSO PETROLEUM COMPANY, LIMITED, 36 QUEEN ANNE'S GATE, LONDON, S.W.1



A complete Type **AD.107B** transmitter, in standard racking.

Combined transmitter/receiver controller Type 1620.



Receiver Type AD.114.

A radio installation comprising **AD.107B/114** provides long distance pilot operated HF R/T for modern airline requirements.

- **120 watts R/T**
- **Frequency coverage 2 — 18.5 Mc/s**
- **20 crystal-controlled communication channels**
- **10 extra crystal-controlled receiving channels**
- **Pilot's controller operates both transmitter and receiver**
- **Unit construction with maximum accessibility**

MARCONI air communications

MARCONI'S WIRELESS TELEGRAPH COMPANY LTD · CHELMSFORD · ESSEX

The Snarler ready to run on the experimental test-bed. The chain safety-curtain was provided for use during early work with rockets.

Playing with a bucket of liquid oxygen to demonstrate its harmless nature. Asbestos gloves were used as a precaution against extreme cold.

SNARLER . . .

boiling-point of −183 deg C, it bubbles merrily in the ordinary atmosphere. At this temperature its density is 71.2 lb/cu ft and a gallon weighs 11.4 lb. It is quite innocuous, and, if placed near burning material, only causes it to burn more rapidly or brightly. If a match is thrown into the bucket it burns brightly on the surface of the liquid. It is quite safe to touch the oxygen momentarily, or splash it out of the pail, but it is intensely cold, and more than a second in contact with it might cause frost-bite. Tricks tried to test the cold were to immerse a flower in the liquid for a few seconds and then to tap it on the ground, whereupon it fell in fragments as if made of blown glass. A rubber hose held in the liquid came out like an iron pipe, and, when hit hard with a hammer, cracked into pieces. After warming-up again, the rubber seemed not to have suffered in any way from its severe freezing.

So far as its other properties are concerned, liquid oxygen seems to be harmless enough; for example, it does not corrode, burn or attack metals, but it should be kept away from liquid fuels (it is not, however, spontaneously combustible if mixed with them).

Of particular importance is the cheapness—according to Armstrong Siddeleys, about 2d per lb, or almost the same as distilled water, and quite easy to produce in large quantities, principally by separation from the air. The British Oxygen Company produce it in bulk for a number of purposes—at the rate of some thousands of tons per week, we are told. A disadvantage of liquid oxygen as an oxidant is its ready evaporation, which in practice might necessitate regular topping-up of fighter fuel tanks. Liquid oxygen can be produced with the aid of portable plants.

A recent article by Dr. E. Sänger in *Interavia* gave some figures for rocket-fuel costs, as follows :—

	Dollars per kg
Kerosine	0.04
Liquid oxygen	0.07
Alcohol	0.09
Nitric acid	0.10
Hydrogen peroxide	1.40
Jato rocket propellants	5.00
Smokeless powder	10.00

Additionally, comparative figures for specific fuel-consumptions were tabulated, and among them were :—

	Kg/sec-ton
Piston engine at Mach 0.5	0.2
Turbojet at Mach 1.0	0.4
Ramjet at Mach 1 to 4	0.9
Alcohol/oxygen rocket at all Mach Nos.	4.5
Solid-fuel Jato rockets	7.0

NATO GETS DOWN TO IT

An International Aircraft-production Programme, and What It Implies

INTERNATIONAL organizations are invariably somewhat nebulous to the average man, even when they affect his daily life. And the North Atlantic Treaty Organization is no exception; even citizens of the 14 member-countries rarely have any clear idea of what this NATO business is all about.

Which is a pity, because there is now every chance that, through the principle of collective security which the organization exemplifies, much of the narrow-minded nationalism sometimes found in Europe will be swept away. As a corollary, the future years should see an increasing standardization of fundamental units, both tangible and abstract, between Western Europe, the British Commonwealth and the United States. Already, for example, proposals are afoot to adopt the 60 deg Sellars as the standard form of screw thread, while the decimalization of British coinage is a long-overdue proposal.

But no industry will be more affected by NATO than the aircraft industry—and nowhere more than in Great Britain. In fact, the decisions reached at the last meeting of the NATO council in Paris are fairly certain to have a profound effect on our aircraft constructors—an effect, it may be predicted, which will ultimately benefit all concerned.

The chief of these decisions was, briefly, to equip the NATO air forces with aircraft of European design and manufacture but paid for out of U.S. aid funds. For at least five years the United States Congress and Senate have discussed the advisability of financing European aircraft production, as opposed to the loaning, or donating, of American aircraft to Western Europe under the terms of the Mutual Defence Aid Program. But nothing tangible has emerged from such discussion; there was, perhaps understandably, a certain amount of mistrust of "Europe" which, to many Americans, is seen as a conglomeration of self-important countries perpetually at loggerheads with each other. American domestic politics are also bound to affect such decisions and there are still those in the U.S.A. who feel that the financing of European production would adversely affect the American aircraft industry.

But it is clear that such doubts have not been allowed to influence the decisions recently taken at NATO and, in fact, Washington is eager to place orders with numerous European manufacturers.

This is an unprecedented state of affairs. It is internationalism in an immediately practical form, and on a huge scale. There are two main branches of development of these American-European contracts; the financing of European aircraft production already discussed, and "off-shore procurement."

"Off-shore procurement"—a horrid example of Washington jargon, suggestive of (if anything at all) beachcombing—is the procedure by which the U.S. armed forces are supplied with material, chiefly war material, bought in a country outside the metropolitan United States. Today such procurement consists almost entirely of orders placed in Western Europe by contracting officers of the U.S. Army, Navy and Air Force. Beginning in a small way with the placing of local contracts for the supply of provisions and spare parts to American units stationed in Europe, it is now responsible for a considerable proportion of the defence material required by this theatre.

The financing of European production *for European consumption* is now well under way and stands at a figure of £244,221,000 for contracts placed during the last American fiscal year, which ended on June 30th last. These contracts, 94 per cent of which were

NATO GETS DOWN TO IT . . .

placed by contracting officers of the American Services, provide for production up to the end of 1955; when they have been fulfilled defence material to the value of £214m will be distributed to the 14 NATO countries by the Mutual Security Agency and the remaining £30m will be retained to supply American units.

France has the largest share of these contracts—£119,642,000—which is understandable, for she has the largest untapped reserve of industry. Italy is committed to the tune of £46,071,000, Britain to £24,642,000, Belgium to £16,428,000 and the Netherlands to £13,571,000. Nearly all these orders were placed in the last days of June of this year.

We have said that the British aircraft industry will be affected more than any other by this programme, yet the British share of these dollar orders is not by any means the largest. This is explained by the significant fact that, where aircraft are concerned, nearly all the production envisaged will be of types of British design, while the fact that British aircraft manufacturers are already working at full pressure—or near it—precludes the acceptance by them of additional orders, even for dollars. Thus we are faced with another unprecedented situation—the British aircraft industry competing for dollar orders with Continental firms producing British aeroplanes under licence.

We have, in the past, granted many licences to foreign firms for the production of British aircraft and engines; additionally, there have been many tentative discussions in recent months upon the feasibility of our farming out certain sub-contract work to European manufacturers to ease pressure within our own industry and to fill available, and now idle, capacity in overseas plants —particularly in Italy.

The gradually worsening British balance of payments had all but ruled out this latter possibility, but now that dollar finance is available there is every hope that all the discussed proposals will be implemented. In any event, it is heartening to record the establishment of numerous production programmes in the aircraft factories of Western Europe, based not upon a series of airy, hopeful "targets" but upon the exact available industrial potential, and soundly financed. This can hardly fail to be of the greatest significance, not only upon the defensive strength of the West but also upon the economic and industrial stability and morale of the affected countries. It will also serve to establish (and, in some cases, to re-establish) Britain as the major supplier of both aircraft designs and finished aircraft to Europe and the rest of the world.

It should be profitable at this stage to examine the position which faces the industry of each of the NATO member-nations:

NATIONAL PRODUCTION PROGRAMMES

U.S.A.—The American aircraft industry has never before been in a better position; the present backlog of firm orders runs into many billions of dollars and is growing as fast as deliveries can be made. Labour-growth continues at an impressive rate, notwithstanding the present severe shortage of graduate technicians. Materials, although carefully distributed on a rationing basis, are nowhere in a critical supply state. In short, the industry is healthy, and can accept new orders against reasonably firm delivery dates; unfortunately, American aircraft are more expensive than equivalent machines from elsewhere.

Great Britain.—The economic state of this country should by now be well appreciated and it is responsible for the British aircraft industry having to take its turn with other consumers in the queue for vital raw materials, machine tools and skilled manpower, all of which are needed in far greater quantities than they can be supplied.

But the prospects are gradually getting brighter. At the end of April, the total labour force had risen to 189,100—an increase of 12,100 since the end of 1951 and a rate of growth nearly equal to that required for the desired increase of 50,000 by next March, as outlined recently by the Prime Minister. The shortage of skilled labour is still keenly felt, but careful sub-contracting, the building of housing estates and the super-priority scheme have combined to initiate a noticeable amelioration.

The machine tool and material-supply position is still serious. These new NATO contracts cannot, of course, carry any additional hope for the supply of these items and the bids for these contracts can, therefore, only be made—with certainty—on the basis of the machine tools and raw material held at the present time. Nearly all orders for tools for the British rearmament programme were placed upwards of one year ago and the scale of our programme (for the R.A.F. and Naval Aviation only) is illustrated by the fact that the Hawker Siddeley Group placed machine-tool orders worth £24m as long ago as May, 1951. But these tools were ordered for the original British three-year programme; now that, like America, we have stretched out our re-arming over a longer period it may be that tools and even materials will gradually be available ahead of requirements. We are, at least, better off in these respects than any other European country.

Much revenue has accrued from the sale of licences to overseas manufacturers of aircraft, and this is likely to continue on an increased scale under the NATO programme. But far greater return will be made from the supply of finished aircraft from British factories. And aircraft built against NATO orders will, presumably, have to be fitted into present British production lines. It has been pointed out that little responsibility will devolve upon the firms themselves, beyond a certain amount of reorganization of their schedules according to the direction of the M.o.S.

As regards the "chosen instruments" with which Western Europe will be armed, it appears fairly obvious that the Hawker Hunter will be the most important single item in the programme. Dollar orders for the Hunter are likely to be placed for delivery to many NATO countries. Additionally, the Supermarine Swift and de Havilland Venom can be offered against fairly firm delivery dates and are considered likely runners. Canberra production by English Electric, Bristol, Short and Harland, Handley Page and (in America) the Glenn L. Martin company is considered to be quite sufficient as it is, while medium and heavy bomber production hardly comes into the picture. The need is for fighters, and British fighters at that.

All this means an even bigger demand for the Rolls-Royce Avon in all its versions. This vital engine is coming off the British assembly lines at a satisfactory rate, and new Avon plants are appearing at intervals. In fact, there has been a considerable amount of Avon stockpiling due to the inability of some manufacturers, through lack of manpower, to deliver airframes to schedule. It seems possible that Avons could be made available for "European" fighters without causing delay in home deliveries; Sapphire production, too, is likely to be able to meet the demands of the Gloster G.A.5 schedule and still have some left over.

The representative of the M.o.S. on the NATO committee is understood to have offered British production of the Hunter, Swift and Venom as direct dollar purchases with firm delivery, and without the need for close consultation with the British aircraft industry. Such is the effect of the "stretch-out" of the re-arming timetable over the next three years.

France.—The big names here are Mistrale and Mystère; the former is the state-built Vampire-development, powered by a Hispano Nene, while the latter is a fine, all-swept fighter by Avions Dassault, likewise Nene-powered. It is uncertain, at present, what new airframe and what new engine will be NATO-produced in France; certainly a new engine is needed, and it will probably be British.

Holland.—For several years, Fokkers have been turning out excellent Meteors, but, now that the last Mk 8 is already scheduled, the plant will soon (except for trainers) fall vacant. For some time, there has been a rumour that the Meteor will be followed by the Swift, and this is quite possible.

Belgium.—The Fabrique Nationale has for long been turning out the Rolls-Royce Derwent for the Benelux Meteors. Now the factory have offered to tool-up for the Avon, with the possible Fokker-Swift in mind; this proposal, however, is understood to have been unfavourably received by Rolls-Royce, who at present are strongly opposed to the supplying of any foreign power with details of this engine. The original NATO council decision provided for any country to decide whether it could part with a secret design or not.

Contracts worth $46m have already been placed in Belgium and this total will certainly be greatly exceeded shortly. Avions Fairey will soon taper-off Meteor production in favour of something else, and time will show which fighter it will be.

Italy.—Already heavily committed to the de Havilland Venom, with its Ghost turbojet (the Venom is going into production by Fiat, Alfa-Romeo and Macchi, and the Ghost by Fiat and Alfa-Romeo), Italy appears likely to get the largest contract for Venom N.F.21 and Sea Venom N.F.20s for the NATO countries, although whether British production would tend to compete in this is uncertain. First British Venoms are about to be delivered, and the type is spread over numerous British firms, although not to the extent once foreseen. It is considered unlikely that Italy will be called upon to manufacture any aircraft of native design.

Canada.—This already great aircraft-producing country is potentially the largest supplier of NATO aircraft, for her industrial capacity is rapidly assuming huge proportions, and the demands of Canada's own Services are small. The American-owned Canadair plant has already delivered several hundred Stars (F-86A and E Sabres) for the R.C.A.F., U.S.A.F., and the R.A.F., the newest of which will be Orenda-powered. To what extent Sabres will be delivered to NATO is not known; it is probable that the three Air Forces named will continue to be the only users of this fighter. For some two years, at least, it is unlikely that Canada will export many military aircraft, but the position should by then be very different.

Other NATO countries.—These read as: Greece, Turkey, Norway, Denmark, Iceland, Luxemburg and Portugal. It is not likely that these countries will be called upon to equip their air forces with aircraft of their own manufacture for a number of years.

The RAF's new super-priority all weather fighter

Two Sapphire turbojets for unbeatable power

Britain's first operational delta-winged aircraft—"the best night fighter in the world"

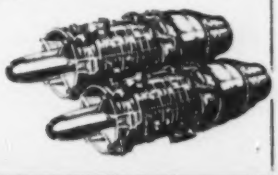
High mach number with proved docility at low speed

Capable of continuous development in many roles

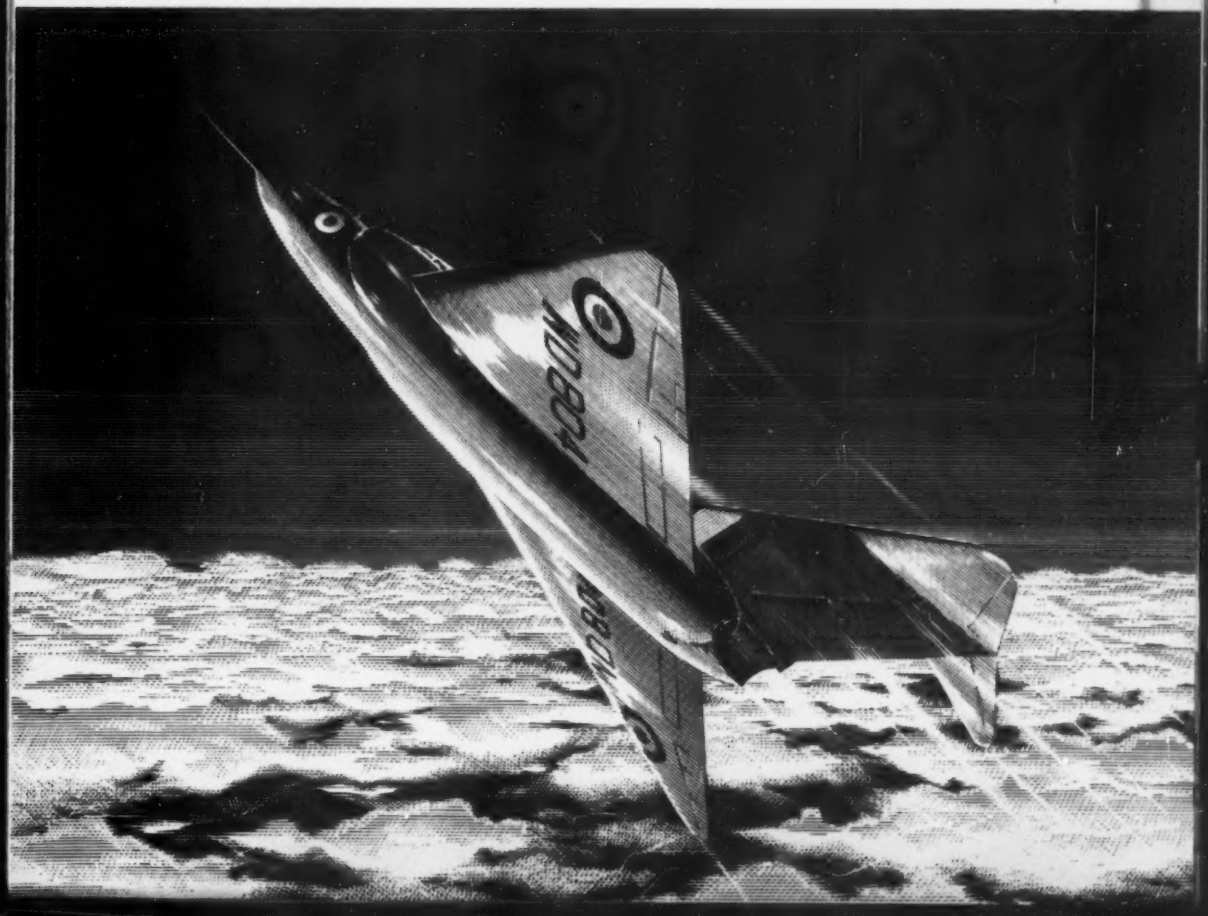
GA·5

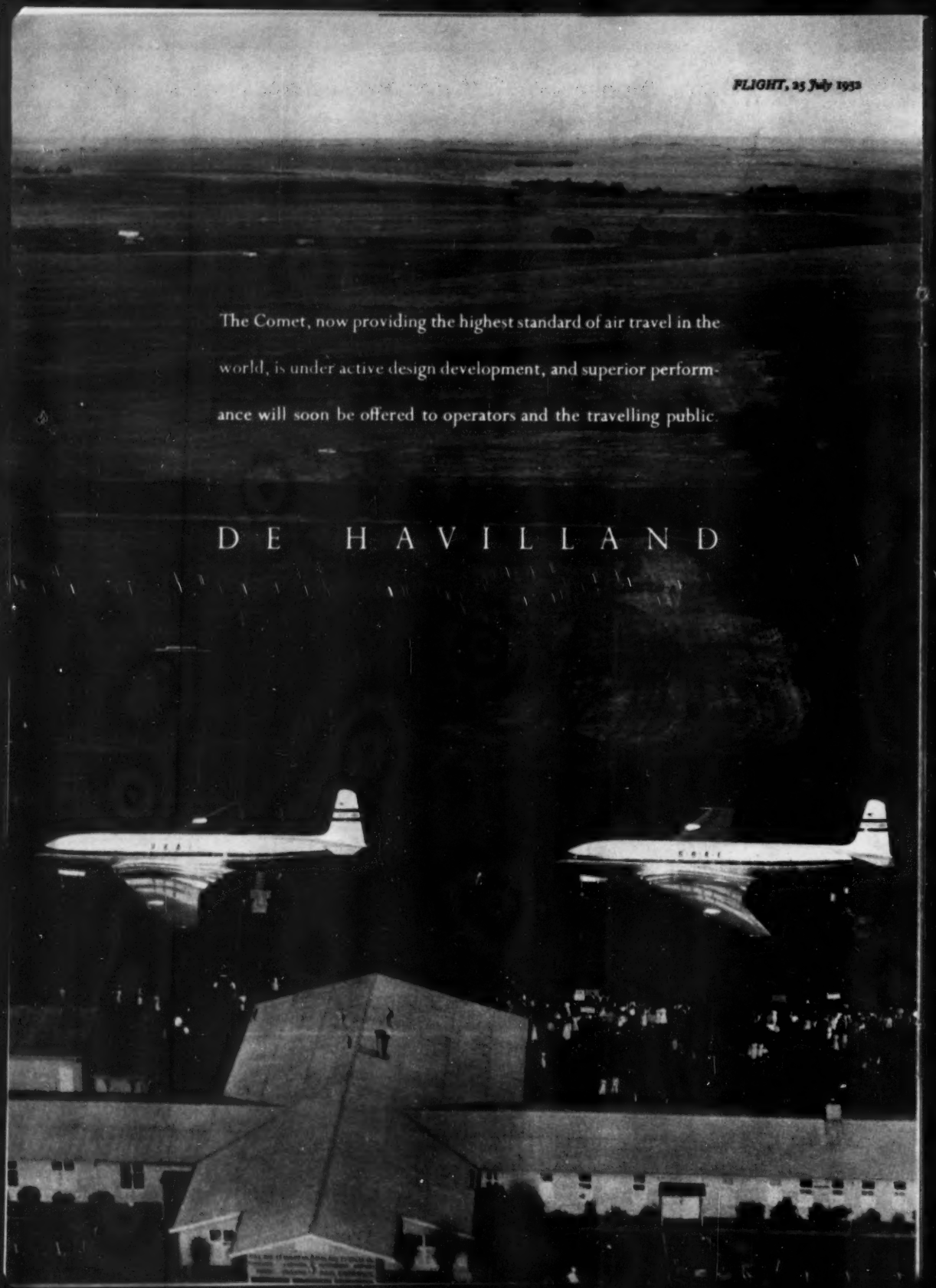
GLOSTER AIRCRAFT

ENGINES BY ARMSTRONG SIDDELEY



A product of the Hawker Siddeley Group

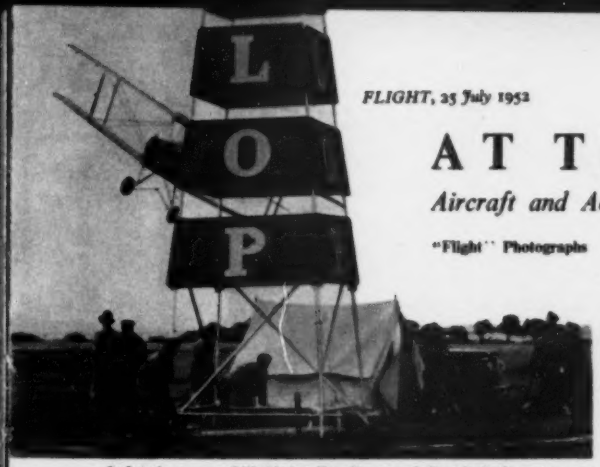



The Comet, now providing the highest standard of air travel in the world, is under active design development, and superior performance will soon be offered to operators and the travelling public.
DE HAVILLAND

AT THE RACES

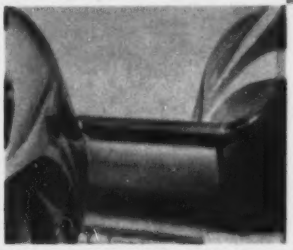
Aircraft and Activities at the National Meeting

"Flight" Photographs

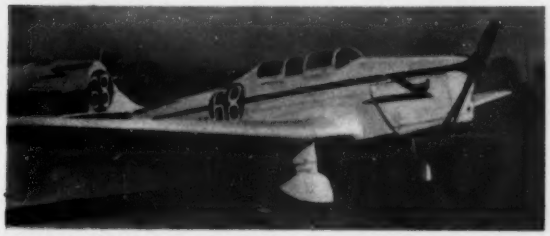


Definitely a case of "hold that Tiger"—one of Chandler's fancy turns at Woolsington. The aircraft had been lent to him by Hayhow.

The fastest man, Wilson (Vampire), receives the Air League Trophy from Field-Marshal Viscount Montgomery. On the right, W. P. Bowles receives the Norton-Griffiths Trophy.



(Left) Somers' Major-Gemini had modified air intakes. (Right) The fixed slats on Dunkerley's Gemini are an example of glass-smooth fairing.

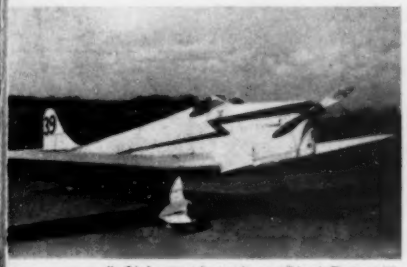


Chandler's 1950 King's Cup winner offers an interesting comparison with the open Hawk Major below. Later it was badly battered by power cables.

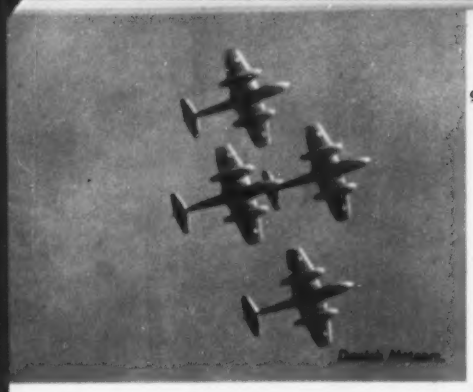
It is an unfortunate state of affairs which practically precludes the appearance of new types of aircraft in British air races and confronts the flying enthusiasts with almost the same old aircraft each year and on each occasion. Nevertheless, it is possible, perhaps, to take a more personal interest in a machine one knows well, and certainly the lack of really new equipment, especially of the sporting kind, calls forth the maximum ingenuity on the part of competing pilots and entrants.

Fred Dunkerley, who did not have good luck in the National races this year, is probably chief exponent of the cleaning-up technique with both airframes and engines. The other Throttle-benders come high on the list of those with specially prepared machines, but more and more individuals are also working to find an extra few m.p.h. out of well-known aircraft.

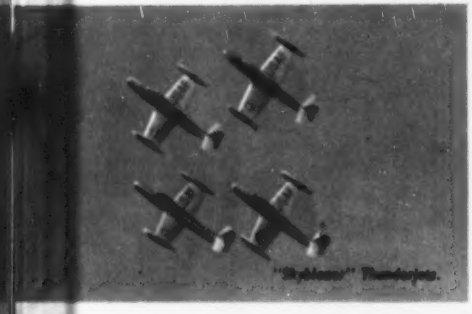
On this page are to be seen examples of Dunkerley's and Somers' attention to detail, two very different versions of the basic Hawk Major, and, in contrast, a good-as-new veteran and two foreign specialists seen at the recent Newcastle meeting. There are rumours that next year there may be one or two exciting new private-venture aircraft in the field. It is to be hoped also that the only remaining Mew Gull will one day be back on the scratch line. In the meantime, many of the old and medium-old-timers will undoubtedly soldier on and, with a touch of polish here and there—together, perhaps, with a little more compression—they may outpace both rivals and handicappers.



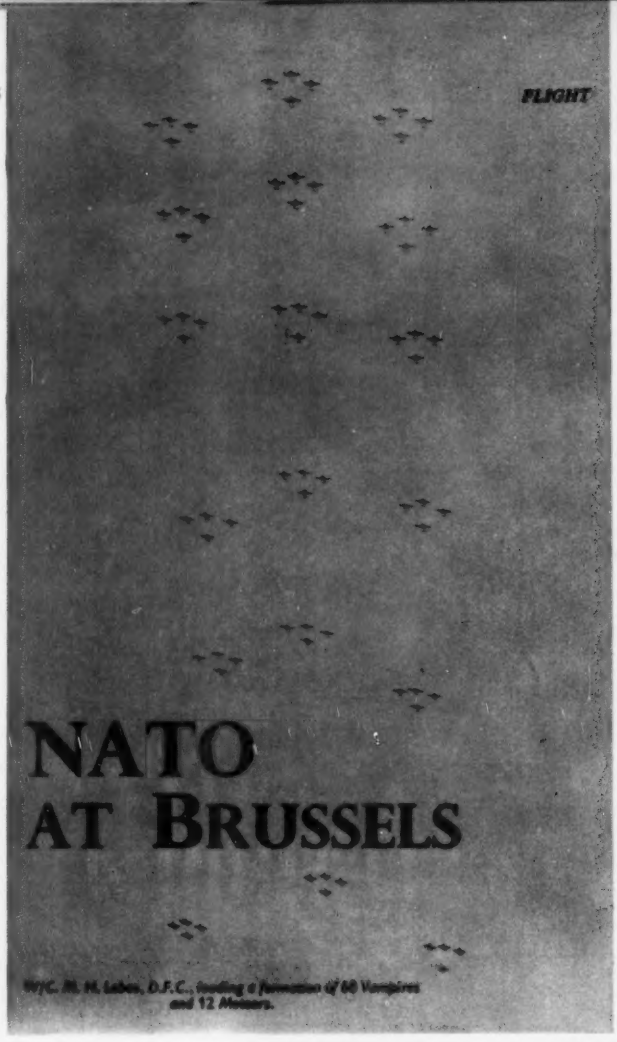
(Left) Jemmett's single-seat Hawk Trainer III. (Centre) Prince Cantacuzene starts up his aerobatic Jungmeister. (Right) A handsome and now unique veteran, the Bristol Fighter (R.-R. Eagle), demonstrated by W/C. Martin. (Lower left) The sleek Ambrosini Supersette (Gipsy Queen 70) flown by G. A. Ferrari. (Lower right) The modified and much cleaned-up Miles Mercury VI (Cirrus Major III), one of two machines raced by Dunkerley.


Danish Meteors.

2nd T.A.F. Vampires.

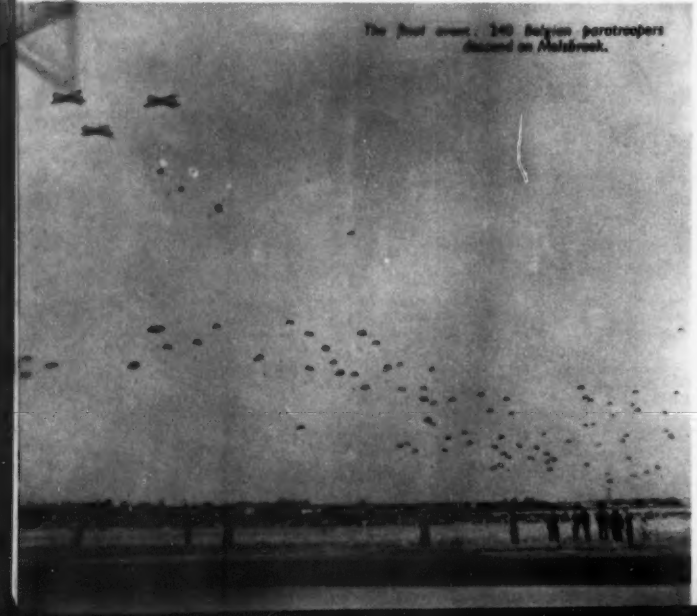

"Skyblazers" Thunderjets.

NATO AT BRUSSELS


W/C. H. M. Lebas, D.F.C., leading a formation of 60 Vampires and 12 Meteors.

(Above) Fo

A Fur


The first wave: 240 Belgian paratroopers descend on Malsbroek.

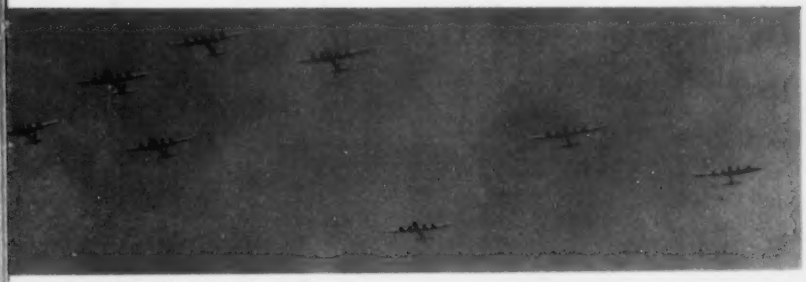
Gen. Lauris Norstad chatting with Marshal of the R.A.F. Sir John Slessor.

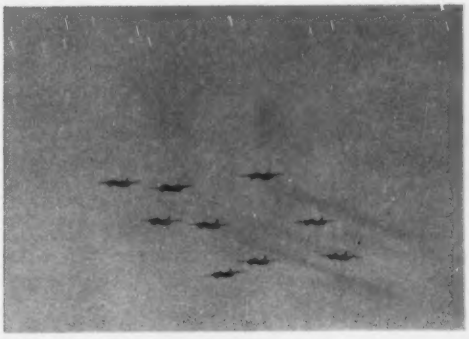
An illustrated account of the display appeared in last week's issue: on these two pages are further "Flight" photographs.

Vickers Supermarine Swift.

urteen Belgian S.V.4s present the national flags of the NATO nations. (Below) Part of the formation of U.S.A.F. B-50s.

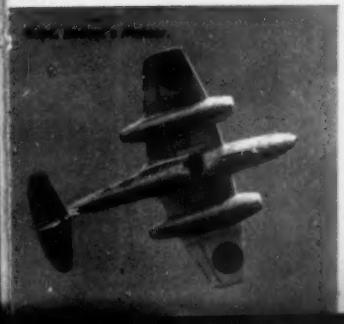
her Selection of Photographs from the Big Melsbroek Flying Display



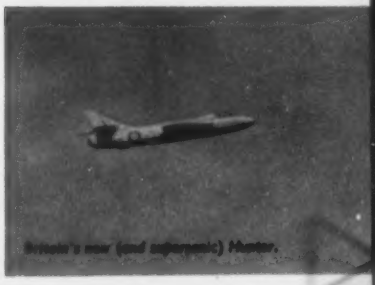


Six Canberras and nine B-45 Tornadoes pass over the airfield in company.

Thirty-one Thunderjets fly in salute to H.M. King Baudouin.



Fokker S.14 undoer rolling.

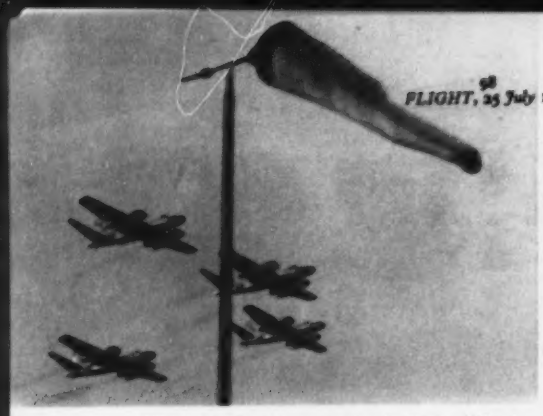


Britain's new (and supersonic) Hunter.

Capt. Alvarez leaves his Sabre 14.

A solo Canberra performs.

F/L. Kelly departs in his R.C.A.F. Sabre.



Immersion suits are donned (above) for the flight to England.

(Above) Four Tornadoes sweep over Sculthorpe, H.Q. of the 49th Division, on arrival from Iceland. Below are F-84s and B-45s at Langley A.F.B., Virginia, before departure.

49th Division in Britain

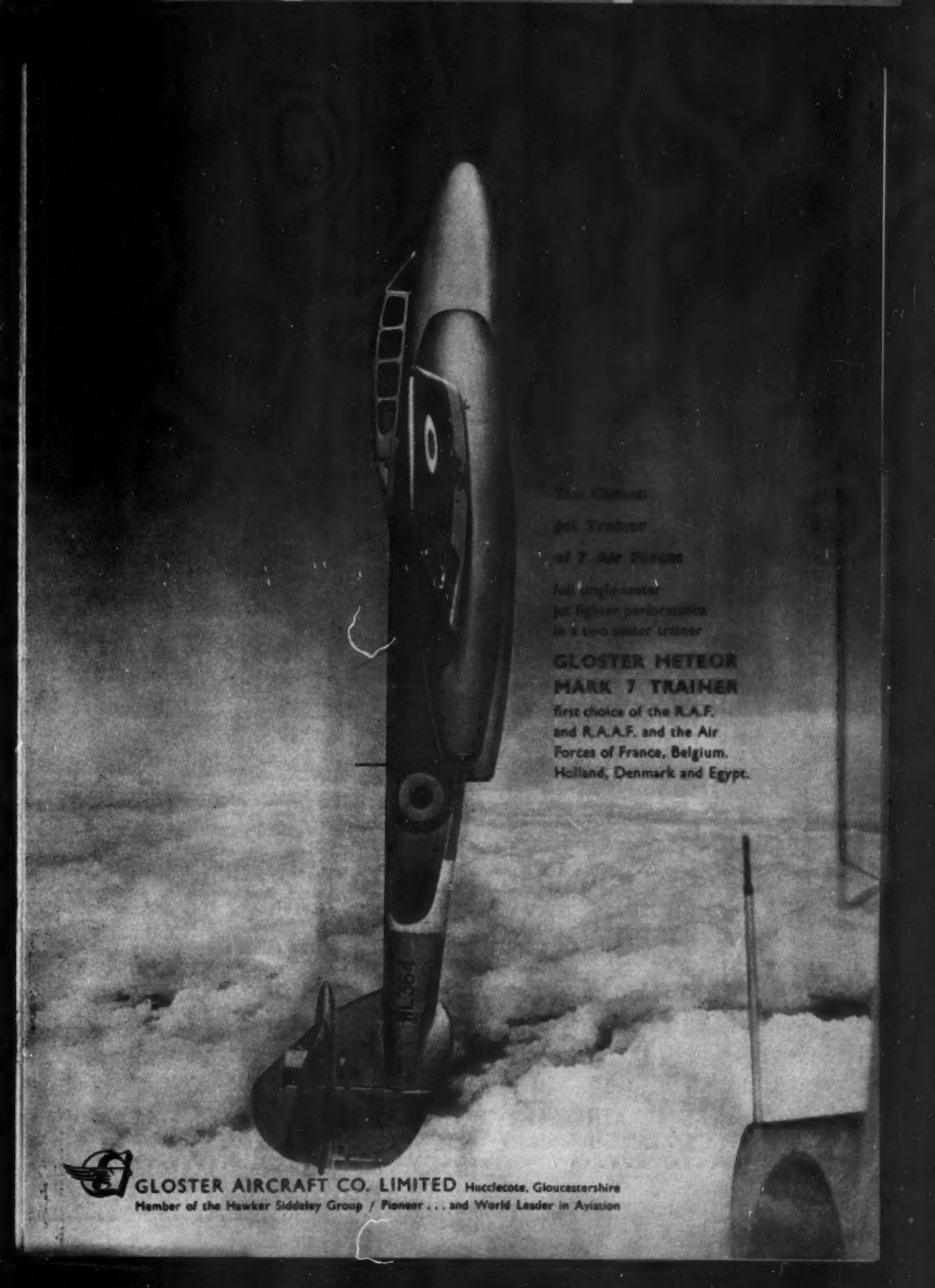
AMONG the numerous American units which supplement European air power under the terms of NATO is the 49th Air Division, which recently arrived from Langley Air Force Base, Virginia, for a tour of duty in England. Commanded by Col. John Stevenson, the division is a composite formation consisting of the 47th Bombardment Wing and the 20th Fighter-bomber Wing. North American B-45 Tornado jet bombers equip the 47th Wing, commanded by Col. David Jones, who was a flight-commander on the famous Tokyo raid led by Gen. Doolittle in 1942. The 20th Wing, whose C.O. is Col. John Dunning, is equipped with Republic F-84G (flight-refuelling) Thunderjets.

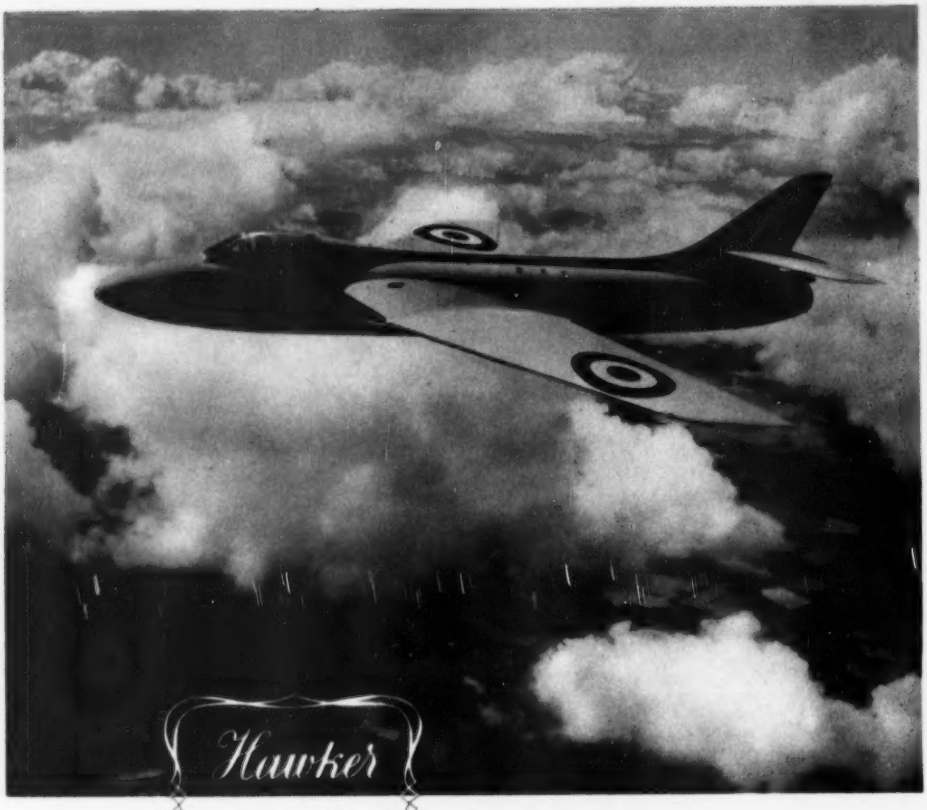
Before their journey to Britain by the Northern route, aircrews of the 49th Division underwent operational training at Langley A.F.B., where most of the photographs on this page were taken. Instruction was given in ditching and air-sea rescue procedures and the use of water-survival equipment.

During the past few years, F-84 Thunderjets have become a very familiar sight over the British Isles; although Tornadoes have periodically been based at Manston and Sculthorpe, the characteristics of this useful machine are less widely known. The compact appearance of the B-45 belies its considerable bulk—it spans 89ft, and its gross weight of over 82,000 lb is slightly greater than that of the Lincoln. Normally the Tornado is operated by a four-man crew—pilot, co-pilot, navigator/bombardier and tail gunner. Its tactical radius with full tankage (4,500 U.S. gallons in internal tanks and 2,400 gallons in tip-tanks) is given as 1,200 miles. The B-45Cs illustrated here are shown with new auxiliary tanks fitted beneath the paired nacelles of the J-47 turbojets.

The Tornado has been in squadron service with the U.S.A.F. since 1948, and is therefore the most "experienced" jet bomber in the world.

Tail-gunners' positions, with mountings for two 0.50in remotely controlled guns, are prominent in this study of a Tornado line-up at Langley A.F.B. These impressive American four-jet bombers are now becoming a familiar sight over East Anglia.


jet Trainer
of 7 Air Forces
full single-seater
jet fighter performance
in a two seater trainer
GLOSTER METEOR
MARK 7 TRAINER
first choice of the R.A.F.
and R.A.A.F. and the Air
Forces of France, Belgium,
Holland, Denmark and Egypt.
GLOSTER AIRCRAFT CO. LIMITED Hucclecote, Gloucestershire
Member of the Hawker Siddeley Group / Pioneer . . . and World Leader in Aviation



Ejection Seats designed by the Martin-Baker Aircraft Co. Ltd. and fitted to all high-speed aircraft

Martin-Baker

AIRCRAFT COMPANY LIMITED

HIGHER DENHAM NEAR UXBRIDGE MIDDLESEX

Airline Operational Responsibility

A Plea for the "Flight Dispatch" System

By RUPERT H. GILES, D.F.C.

AT long last the re-equipment of British airlines with aircraft of British design and manufacture is under way. By and large, B.O.A.C. and B.E.A. have been working on a sound policy—that of operating foreign-built aircraft while awaiting the evolution of really first-class British transports. That policy, it seems, is now about to produce dividends, and the two British Corporations will be first in the two separate fields of turbine transport operation.

But, as always, such pre-eminence brings with it certain responsibilities, and it is essential that both Corporations should realize that they have to prove to a still slightly sceptical world the soundness of their judgment. (Results from other undertakings which have since ordered Comets and Viscounts will not be available for a long time, and many airlines now sitting on the fence will jump one way or another according to the indication they receive from the experiences of the two Corporations.)

If the Corporations adopt an incorrect or shortsighted policy of operation; if they resolutely refuse to consider any methods but the present ones; if they are not prepared to accept the limitations on current techniques imposed by the limited endurance, weight for weight, of fuel; then the Comet and the Viscount may even yet be relegated to the position of "interesting experiments, but impracticable economically."

The situation was admirably summed up by Lord Douglas of Kirtleside, chairman of B.E.A., writing in *The Observer*:—

> "If we can find the means to exploit our present technological triumph, we can now capture the skyways of the world. If we fail, the British airlines, having waited for this moment and subordinated the present to the future, are going to have a difficult time holding their own against competition from foreign airlines using American types of aircraft. Nor is the opportunity likely to recur. It is now or never."

The basic requirements for the success of this endeavour are also the prime attributes for successful operation—namely, safety, economy, regularity, the utilization of capacity to the full, and reduction of ground time to a minimum. The greatest demand on ground time is made by the requirements for maintenance, and this can only be reduced by sound principles of design; by the insistence of the operator on the utmost simplicity of construction. Mr. Arthur E. Raymond, in the Thirty-ninth Wilbur Wright Memorial Lecture, had some very sound comments to make on the value of simplicity. "Complication is sometimes the path of least resistance for the designer," he said. "It is either the result of lack of knowledge or lack of adequate thought." The jet, at least, cannot be said to be over-encumbered with complications, and it has been confidently forecast that maintenance hours per flying hour will reach a new low level. The effort must therefore be made to effect a reduction of ground time demanded by other requirements—loading, re-fuelling, flight planning; and if it is possible, at the same time, to reduce non-productive flying and dead load, so much the better.

If such is possible with jet airliners, then so is it possible with piston and turbo-prop driven machines, and though the saving may be smaller it is still worth while. The advent of the jet transport has only served to underline the necessity, to make the requirement more urgent.

What is wanted, clearly, is a new operating technique—a new form of administration and control which can give enhanced safety, increased utilization, economy of fuel and flying hours, reduce ground time to a minimum, and offer increased capacity based on flight fuel requirements and the paring down of excessive fuel reserves.

British airlines have on the whole a very good safety-record, but this is not to say that it cannot be bettered. As long as accidents occur, in any form of transport, in any form of human activity, then efforts must be made to eliminate the causes. The knowledge that the total elimination of death by misadventure is an unattainable ideal should in no way lead to complacency when the occurrence is reduced to acceptable limits; every accident, fatal or otherwise, somewhere pinpoints a human weakness.

It must be admitted that the British airline accident-rate over the past few years has not been so good as that of the Americans. Apologists speak of British weather as the worst in the world; but American carriers nowadays encircle the world and meet every meteorological phenomenon. Certainly the United States is very well provided with radio aids to landing and navigation, but most European countries provide reasonably adequate coverage and American utilization of European aids must be almost as high, if not higher, than British. Again, the United States has a finely developed system of air-traffic control, but the prime function of A.T.C. is, to quote from the definition accepted by the United Kingdom, "to prevent collisions between aircraft; to prevent collisions in the manœuvring area between aircraft and obstructions, and to expedite and maintain an orderly flow of air traffic." That control performs this task with a very high level of efficiency, at least in so far as the prevention of collision is concerned, is evidenced by the very few accidents attributable to this cause.

There is an unfortunate tendency in this country to imagine that A.T.C. has a wider responsibility than this. Certainly, at Air Traffic Control Centres there are established Flight Information Services, which in effect offer a form of ground-to-air briefing; but beyond that there is nothing. American operators have long realized that something more is needed and have established a system of company operational control which they have invested in an official they designate as a dispatcher. European airlines have generally followed suit, though rather more slowly; a number held back, and Sir William Hildred, before I.A.T.A., told the airlines, "You now have operational control—it is up to you to use it!"

The Personal Factor

There are now grounds for believing that B.E.A. are introducing a number of senior captains into their operations organization with a view to offering guidance and advice on weather and landing conditions to airborne pilots; and this is a step in the right direction. Just how valuable an innovation this will be only time can decide; but the system is not without its weaknesses. So much will depend on the person selected as a flight dispatcher. Certainly, considerable flying experience is an advantage, though, paradoxically, it can also be a handicap. Pilots who retire from active airline flying do so for a variety of reasons, but principally on medical grounds or through advancing years. Broadly speaking, however, once a man has embarked on a flying career, he does not cease active flying until he finds that the mental strains and stresses are too great for him, and he realizes that he is losing the clarity of mind necessary to cope with emergencies. Instrument flying becomes more of a strain; self-confidence begins to ebb, and rightly, the pilot decides to retire, or take a desk job and fly only now and again.

If retired aircrew are to be made into dispatchers, there is a possibility that they will tend to interpret a situation according to their own reactions, which, though based on considerable experience, are coloured by their diminished self-confidence. Added to this are (*a*) the reputation they have gained within the operating agency, and (*b*) their seniority, both of which might tend to sway a more junior airborne colleague against his better judgment. Experience, too, whilst being of immense value as a guide, may in time ossify the mental process into a strait-jacket.

The dispatcher, necessarily, must be a person with flying experience; must have self-confidence in his own judgment, with a receptive mind, adaptable and selective; and above all, he must have a thorough knowledge of his job, based on upward progress through the various levels of an operations organization. Experience of economic and commercial problems of air transport is also a necessity, so that he will not lose sight of the primary function of any business, be it air transport or what—to make money.

A great business asset to any airline is a reputation for safety and regularity—and not only for the safe delivery of passengers at their destination, but for the safe delivery of *happy and confident* passengers.

Economically, it is better to kill a load of passengers than to deliver them badly frightened at their destination. Mr. Peter Masefield has drawn attention to what he calls the "public forgetfulness factor," which allows the depressing effects of a fatal accident to be of short duration, but this is dependent to a large extent on the percentage of survival. A badly frightened passenger is a greater menace to sales than is the report of his demise, for in the first case the influence is continuous; and for every fatal accident there are several near misses or disturbingly eventful flights. With the growth of air travel, and the expansion of technical knowledge among the public, the average "awareness" of airline passengers is much greater than it was in days gone by; and consequently it is more difficult to assure them that a frightening incident is all part of the day's work and that technical advances are such that flight, or landing in conditions recently experienced, can be undertaken with an acceptable safety-margin.

It follows, naturally, that if the "near misses" can be substan-

AIRLINE OPERATIONAL RESPONSIBILITY . . .

tially reduced, the incidence of fatal accidents will likewise be lessened, and a twofold objective will have been achieved—to prove statistically that greater safety has been maintained, and to gain a reputation for safe and comfortable operation.

While it is not possible to quote any statistical relationship between the occurrence of "near accidents" and actual crashes, there exist a sufficient number of accident reports to shed some light on means of reducing or eliminating these disasters. Since the end of the war, at least 16 accidents to U.K. aircraft could have been prevented by effecting an early diversion or alternatively delaying or re-routeing the proposed flight.

The B.E.A. Viking accident at London Airport led directly to the investigation conducted by Lord Brabazon into the relative responsibilities of aircraft captains in relation to the operating agency and to the airport authorities. In issuing its report, the committee made the first direct official reference to flight dispatch. In view of the wider implications, no specific recommendation was made, but the system was described as worthy of further investigation. Sooner or later we must face the fact that, in these days of aircraft of high speed and great weight, the system of investing complete responsibility in the captain is showing weaknesses hitherto unsuspected. It worked fairly well in the past with aircraft, which, by comparison with the newer types, were highly manœuvrable and of low speed; but with the call for greater regularity, higher frequency and the mounting cost per hour of delay, it is proving less and less suitable.

The report of the Brabazon Committee stated that pilots, while not consciously compromising the safety of their aircraft, are influenced on psychological grounds into attempting a landing in dangerous conditions. Such pilots may feel that diversion suggests that their professional qualifications cannot match the situation; they appreciate the inconvenience caused to passengers and to passengers' friends who may be waiting to meet them; there may be personal grounds—a natural desire to land at the home base; to bring to an end an arduous tour of duty; an appointment to be kept. It is not suggested that any of these matters will consciously affect a pilot's judgment, but, in marginal conditions, they may unconsciously sway a man's judgment.

If the decision is taken out of the pilot's hands these considerations do not arise; and if it is company policy to issue instructions to divert when a flight operations officer considers it necessary, then no one can claim that the captain's professional capabilities are called into question. It is appreciated that conditions do arise when it is imperative that a landing should be attempted even if weather conditions are unacceptable, or that a flight should be continued despite the presence of meteorological hazards. A failing engine, reduced fuel reserves, leaking hydraulics—many such occurrences suggest themselves; and as only the captain can be fully informed on these matters, then the final decision must always be left to him as to whether he will (*a*) place the aircraft in greater jeopardy by accepting the advice sent him from the ground, or (*b*) proceed with his flight in the manner he considers to offer the greatest margin of safety.

In such an eventuality, however, the pilot should be required to render a report after landing, stating the circumstances and the action taken.

Sharing Responsibility

The essential principle of flight dispatch is joint responsibility between pilot and flight operations officer as to the safety of any flight, from its inception to the time of landing. In assuming this joint responsibility, the flight operations officer becomes equally answerable with the captain for mistakes or errors in the preparation for the flight and in those details of its execution over which he might have some control. After full consultation with the captain, and when mutual satisfaction has been reached as to the safety of the proposed operation, the flight operations officer will be responsible for determining the route, obtaining the forecast, preparing the flight plan and calculating the fuel requirement.

Here, flight dispatch may make a real contribution to economy in addition to its function as a safeguard against accident: with positive control it should be possible on many routes, if not on all, to reduce the fuel requirement set aside as a reserve. Whilst an aircraft will still need fuel to reach its destination, to stand off for a period and to divert to another airfield, the stand-off allowance as well as the diversionary fuel could be pared while yet maintaining an adequate safety-margin, and thus make available (subject to structural limitations) additional capacity for payload.

Fuel for destination to alternative airport could be such that it would be required only in the event of the mechanical unserviceability of the destination airport (an obstructed runway, for example) and not to cover meteorological contingencies which would be met by the nomination of an in-flight alternative to which the aircraft could be diverted in the event of an unfavourable forecast for the airport of destination and its environs. Where no in-flight alternative exists (as, for example, on the North Atlantic) a saving could still be made—e.g., an aircraft bound for Goose Bay could be diverted to Gander direct instead of *via* Goose, with Stephenville, Sydney, Argentia, or some other adjacent airfield as the alternative in case of unserviceability at Gander.

A further substantial contribution can be made by the closer matching of fuel requirements to conditions prevailing and the utilization of the maximum capacity for paying load*. There has been an unfortunate tendency in the airways industry to over-specialization, which has given rise to three departments where two only should exist—the function of loading, capacity and trim has somehow been regarded as a specialist subject all its own. Basically, a transport undertaking has two branches—(*a*) the operations branch, which manufactures the raw material, and generates capacity in this case; and (*b*) the commercial branch, which sells it. The division of the operations branch into "operations" and "traffic" has produced a hybrid which endeavours to usurp the functions of both the main branches to the benefit of neither and the sequestration of loading and trimming by "traffic" has saddled the industry with an uneconomic burden. If sales can produce the consumer, operations will produce the goods to satisfy him; namely, utilized capacity in motion.

Fixed fuel-figures based on statistically calculated average wind components mean that every aircraft flies with a built-in headwind, and this is equivalent to blocking-off a cargo hold or taking out seats in order to accommodate an invisible, intangible figure. Next time you fly in an airliner and look at that empty seat, it may not signify freight in the hold; it may mean an incomplete sale of space, or, quite probably, it will be occupied by a mathematical notation—the difference between the actual and the 85 per cent average wind component; the notation is a passenger who rides free on the routes of all operators who base their fuel on fixed-stage uplifts.

Alternative Methods

Two other methods are open to the operator—(*a*) to sell up to the figure he believes can be carried in a similar manner to that operated with fixed-stage fuel uplifts and then to book additional stand-by load which may or may not go, or (*b*) to fix a minimum payload (based on the aircraft capacity) which *must* go if humanly possible, and then book, at lower rates, stand-by freight or imperishable cargo which will go if the capacity is available.

The former method leads to disappointed customers, the latter to the maximum revenue per given stage; and it is within the power of flight dispatch to make available the maximum capacity with adequate safety. The minimum payload will be based on a profitable load-factor, not on a wind component, and if 60 per cent is the break-even, the minimum payload will be of the order of 75 per cent of the aircraft capacity over its optimum range

It is up to the flight dispatcher to plan the flight in order to secure the utmost economy of fuel consistent with conditions existing and to make available to the commercial branch the greatest capacity for payload. The function of the commercial department has been to sell up to the minimum fixed load and this should already have been finalized before the flight operations officer has completed his calculations. Additional capacity over and above the fixed load is utilized by shipping stand-by freight and cargo; then the total load is advised to operations, who issue instructions as to its stowage within the aircraft, bearing in mind its destination, the trim of the aircraft, and the structural limitations. This responsibility should be delegated to an assistant so that he may make a visual check that the load is placed where it has been planned to be placed and to make any minor changes that may prove necessary. The load- and trim-sheets, prepared by him in accordance with the general directions of the dispatcher, are signed and countersigned by the flight dispatcher and the captain as being safe and in accordance with their requirements.

When capacity exceeds load, extra fuel may be carried—should it be economical, by reason of differential fuel costs, to do so. When the fixed load exceeds capacity, then the flight operations officer must seek alternative methods of reducing fuel requirements, such as change of altitude, different cruising procedures, the nomination of a nearer alternative, or the making of an intermediate landing. If any or all of these methods prove practicable and the captain concurs, the additional capacity can be made available; if not, then the commercial staff must be consulted as to the advisability of off-loading cargo for carriage by another service. If the aircraft is correctly matched to the route over which it flies, the latter should occur only in isolated cases.

Flight plan and trim-sheet are signed by both the flight operations officer and the captain, signifying the mutual satisfaction of both officers; and an air traffic clearance can then be filed with the local authority for onward transmission to the station of destination, the air-traffic control centres and the company flight-watch

* *The "variable-booking payload" suggested by Mr. K. G. Wilkinson in a paper at the Anglo-American Conference last year.*

centres through whose areas the flight will pass. At these centres a flight watch will be maintained, the progress of the flight being plotted and the captain advised of all pertinent information and of company requirements or suggestions; he will be successively handed from one flight-watch area to the next as the aircraft moves along its track.

At least hourly, the aircraft reports its position, quoting its ground speed, remaining endurance, and weather experienced, and at least half-hourly it makes contact with the station in control so as to receive any information, advice or instruction that the duty flight-operations officer may have to offer. If the destination or any of the alternatives become affected by adverse weather, the captain may receive an instruction to divert, together with a forecast and flight plan for his new route. If unforecast conditions are reported ahead, he may receive advice as to the best method of routeing to avoid the maximum intensity. If, because of adverse winds or some other cause, the fuel reserve falls below a safe margin, he may be instructed to divert for refuelling.

In all these circumstances, however, the captain may ignore the advice or instructions he receives, for it is appreciated that he is the best informed as to his immediate environment. The flight operations officer is, however, placed in a more advantageous position as to conditions ahead and astern, situated as he is in close proximity to the meteorological office, with its steady stream of information always to hand. It is a fundamental aim of flight dispatch to prevent the man on the spot from becoming the man *in* a spot; and his instructions and advice have this, and only this, end in view. A pilot fifty or five hundred miles away cannot assess the fitness of the weather at his destination for the purpose of effecting a safe landing better than can the flight dispatcher who is there.

As the aircraft approaches its point of no return or the limit of the specific control area, the flight operations officer makes a final survey of the route ahead and passes any amendments; or, alternatively, he signifies that, on the latest information, the forecast is still valid. The receiving flight operations officer is meanwhile studying his portion of the route and, on taking over control, confirms or amends the landing forecast and the weather at the nominated or other suitable alternative airports. While the aircraft is continuing towards its destination, the dispatcher is making ready for its onward flight, e.g., preparing flight plans and fuel requirements for the captain's approval when he lands, thus ensuring a speedy transit and the utilization to the best advantage of the time available. This is of increasing importance with the advent of jet transports, when time on the ground represents a so much greater loss of air mileage and hence revenue ton-miles.

If diversion does become necessary, instructions or advice are issued, if possible after consultation with the commercial department, and the necessary arrangements can be made for reception at the diversionary airport. Similarly, if weather conditions ahead threaten to delay the flight, hotel accommodation can be found, and all will be ready when the aircraft lands. Flying hours and costs are reduced by obviating the practice of coming on to the destination to ascertain the accuracy of information received, or in making abortive and possibly dangerous attempts to land, and then diverting with no preparations made for reception.

It would be possible to write much more on the advantages that such a system offers and to expand into detail much that has been touched upon in passing. The licensing of operations personnel, for instance, is a subject in itself; briefly, they will be expected to pass examinations at least as searching as those required of aircrew, and, moreover, they must show proof of their capabilities in practice prior to being employed in the capacity of dispatchers. The advantage of domestic frequencies on long-range R/T. has not been mentioned, for it is yet far distant, but the personal link between pilot and flight operations officer rather than the impersonal anonymity of A.T.C. is yet one other point of favour.

On a world-wide basis, flight dispatch offers world-wide safety and economy. The imposition of, for example, legal landing minima in Australia has not prevented fatalities in the United Kingdom; but flight operations officers, aware of company policy, standards of training, personal traits of captains and the equipment of their aircraft, as well as of the approved operating minima specified by the company, can maintain a close check on infringements of safety regulations and bring forward cases where they are convinced a pilot has taken an unjustifiable risk.

It is the passenger who must be safeguarded, not the personal vanity of the pilot; and it is strange that a system which has proved itself economically, as well as making an immense contribution to safety, should be so reluctantly recognized by British airlines.

TRAVELLER'S FARE

I HAD a meeting to attend in Paris on a recent Tuesday morning and another in Newcastle-on-Tyne on the morning of the following day. There were several routes I could have chosen to enable me to put in an appearance at both meetings without any undue rush. I could, for example, have travelled by sleeper from London to Newcastle on the Tuesday, having flown over from Paris by a mid-day service. However, I do not sleep well on trains and so prefer to do my travelling by day. Finally, I came from Paris on the Air France service which leaves Le Bourget at 1 p.m., arriving at London Airport at 2.45. I had booked a seat on the Tyne-Tees Pullman which leaves King's Cross at 4.45 and is due at Newcastle at 9.42. This gave me plenty of time to get across London from Kensington Air Terminus to King's Cross.

As everyone knows who has travelled by air, it is the getting from town terminal to airport which takes up the time. Once in the air, distances dwindle.

It was a warm day in June—rather too warm for comfort, as we sat in the aircraft on the apron at Le Bourget. However, once we were airborne, the atmosphere cooled off. Within a few minutes of our leaving the ground, the two stewards were busy attending to the passengers' gastronomic requirements. A tray of iced sherry and Dubonnet preceded events. Lunch consisted of cold salmon, cucumber and tomato salad, cold breast of chicken, sliced roast beef and *pâté de foie gras*. A most delicious cold artichoke with mayonnaise followed. Neapolitan ice and a cheese savoury preceded gruyère and crisp brown *croisettes*. With lunch, iced champagne was served. There was the choice of a considerable number of liqueurs: I had a very passable cognac.

It was one of the best meals I had had for a long time. The service I travelled on is rightly called the Epicurean. There is no charge for this luxury lunch—it is served with the compliments of the company. The service is perfect. Tipping is not permitted and I doubt if it is ever practised.

What a contrast British Railways provided when I arrived at King's Cross to continue my journey to Newcastle! The train, having stood in the open outside the station, was stiflingly hot. These Pullman coaches usually have a single four-seat compartment in each carriage. I was unfortunate to find that my seat had been booked in one of these, although I had reserved accommodation at least three weeks before I travelled. The door of the compartment would not stay open, so the inmates just had to sit and stew. (These coaches can be cold and draughty in the winter, as I know to my cost.)

Soon after leaving King's Cross, we were lectured over the loudspeaker on the amenities afforded by the Pullman Company. We were also wished a pleasant journey, which I thought was at least courteous of them.

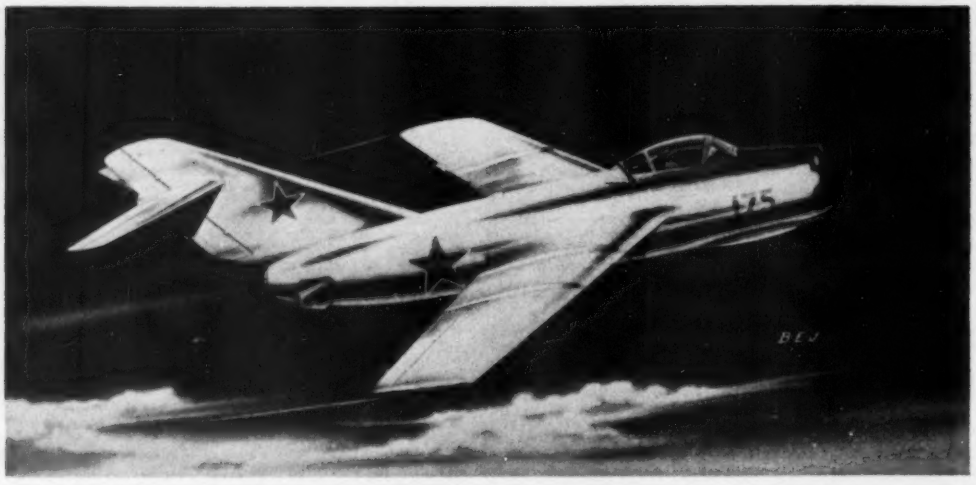
There is nothing wrong with the service on this luxury train. The personnel do their best and hope to get remunerated for it. After the lecture, we were visited by the car attendants and asked to select our dinner from a menu which consisted of a choice of turkey or grilled sole; and of an ice or cheese and biscuits. This gargantuan feast was preceded by a choice of a nondescript soup or tomato juice. The whole was topped off by excruciatingly bad coffee, at a "trifling" extra cost. The soup was tepid; so was the tomato juice. The turkey was greasy. The vegetables, as well as the passengers, were suffering from the heat: both potatoes and carrots appeared to be sweating. I asked for a whisky and soda. I got one quite warm. The bill amounted to 12s 8d without coffee, which I skipped. The Pullman first-class supplement amounts to 12s so that, above the bare fare, there is a trifle of nearly 25s. This is, of course, exclusive of the necessary *douceurs* to the staff.

Having said all this, I shall doubtless be told that I am one of those intolerable people who love to decry anything British. I don't; but, as a Britisher, I do want to see an improvement in our British rail-travel facilities. I am also liable to be criticised for comparing rail travel with air travel. I cannot see this argument, as the comfort of the passenger is, surely, equally important in a plane or in a train.

When I finally arrived home, I read that British European Airways have now revived the luxury luncheon-time Silver Wing service between London and Paris, which was first introduced on April 29th, *nineteen-twenty-seven*, by Imperial Airways. The italics are mine. The luncheon menu on the first trip consisted of Scottish smoked salmon, Aylesbury roast duckling with a sauce made from South African oranges, new-season carrots in butter, Jersey potatoes, hothouse grapes, Wensleydale cheese and biscuits.

Well done, Air France! Without your competition B.E.A. might be supplying B.R. fare, although I am suspicious about the carrots in butter and Jersey potatoes. They savour to me a little too much of my recent Pullman experience. H.T.

[But is the author of this entertaining little contribution altogether fair to B.E.A.? Quite aside from the Silver Wing meals, the average quality of the fare provided on other B.E.A. services is (and, in our experience, has been for several years) superior to that of the railway restaurant-cars.



МИГ-15

A First Detailed Examination of a Modern Russian Fighter

BRITISH and American fighter pilots are usually better mounted than their opponents. This has been true for so long that it is now accepted as the natural order of things, without reflecting greatly upon what is required to bring such a condition about. But sometimes an enemy country succeeds in collecting a design team as gifted as our own and, within a year, our pilots begin to meet a new shape in the sky which gives them a real run for their money. To some extent, this occurred in the Far East in late 1941 when inferior Allied fighters found themselves pitted against the elusive Mitsubishi Navy fighter later to be known as the Zeke or Zero; it certainly happened over Northern France a few weeks later, when the Fw 190 began to be met; and now, although Russia is not an enemy country, the Mig-15 is certainly appearing in large numbers high over North Korea to "mix it" with the finest fighters that the Western world can produce—and prove a worthy foe, when well flown.

Many months ago an early Mig-15 was recovered from the sea off N.E. Korea by the Royal Navy; this aircraft, not irreparably damaged, was shipped to the U.S.A., where it has since been closely examined by engineers of the U.S.A.F. at the great Wright-Patterson A.F.B., Dayton, Ohio; by the Cornell Aeronautical Laboratory at Buffalo; and by Pratt and Whitney Aircraft at East Hartford. We present here a summary of the information which has been gathered.

This particular Mig-15 is one of the earlier sub-types, having been built at Zabod 1, Kuybyshev, in 1948. Structurally and aerodynamically it differs little from the majority of the Mig-15s at present in service, although the newer aircraft carry a rather greater weight of fixed equipment, including gun-sight radar and blind-landing aids. There is also a two-seat variant, believed to be designated Mig-15F, which carries full A.I. radar, and can be used as a true night and all-weather fighter.

The original design of the Mig-15 was initiated in 1946. The design staff—led by Mikhail I. Gurevitch and including a number of German workers—considered sweeping the wings both forward and backward before the present configuration was chosen. The whole undertaking was, of course, quite unlike anything ever previously attempted in Russia, and, in spite of considerable assistance from previous German work, much fundamental research had to be carried out. The design underwent many great changes before appearing in its present form, but the first prototype was nevertheless flying by July 2nd, 1947.

Early in 1947 the first Rolls-Royce Nene arrived from England. Not unnaturally, it was at once decided that the engine should be used in the Mig-15, the 5,000 lb thrust offered being much greater than that of any other engine then available with the same degree of reliability. This decision caused further changes in the Mig fuselage, which had the effect of reducing the maximum internal fuel load. But there is no doubt that the Nenes were instrumental in enabling the Mig project to bear fruit at so early a date.

The Nene was at once prepared for production within the U.S.S.R. and the first production RD-45 (as it became known) was delivered early in 1948. By the time the Mig-15 was ready for operational service the engine had been modified considerably; but the engine will be dealt with later in the story.

The Mig airframe is an "obvious" layout, affording, as it does, reasonable stowage space, straight-through gas-flow, short tail-pipe, and cheap and easy production. On the example inspected the quality of manufacture was very high throughout; materials were in no way inferior to the standard U.S. specifications and skinning, in particular, is reported to have been good.

The fuselage is a conventional semi-monocoque, with a stressed skin (unusually thin for a modern fighter) used throughout. The structure is divided into a nose and mid section, which join to make the forward assembly, and an aft section; the break is made at the rear wing spar at about 70 per cent chord, the two sections being attached by bolts located at the wing root attachment forgings.

All fuselage sections are built up from pressed aluminium-alloy formers of channel or L-section and extruded stringers. The nose section begins with a bifurcated air intake of large diameter. This carries the engine air past the cockpit, immediately aft of which the two air ducts are again split into four quadrant-section passages to carry the air over and under the front wing spar. Between the wing spars these four ducts pass through the engine firewall and deliver into the plenum chamber.

The strong underside of the nose structure carries the nose-wheel attachment and the mountings for the guns, and ammunition is carried in the bottom of the front fuselage adjacent to the guns; behind and above the ammunition tanks are the main fuel tanks, between the engine air ducts. One of the frames of the front fuselage carries attachment points for the front wing spar; although this frame is reinforced it does not carry the main wing loads, which are taken to the fuselage by the rear spar. The rear spar attaches to a steel carry-through structure around the forward plenum chamber; this structure is a heavy ring of "I" section, the extruded steel cappings being joined by aluminium plate webs, which are riveted and bolted on each side.

The rear spar, rear fuselage and engine are all attached to this structure, the wings by a two-pin fastening arrangement and the rear fuselage by quick-release bolts, which permit the entire tail-end of the aircraft to be removed for engine overhaul.

The wings are simple stressed-skin structures assembled as single units attaching directly to the fuselage. The skin is of heavier gauge than that on the fuselage, and a skin-break on both upper and lower surfaces at the outer ends of the flaps permits

AIRWORK services Sabre-jets

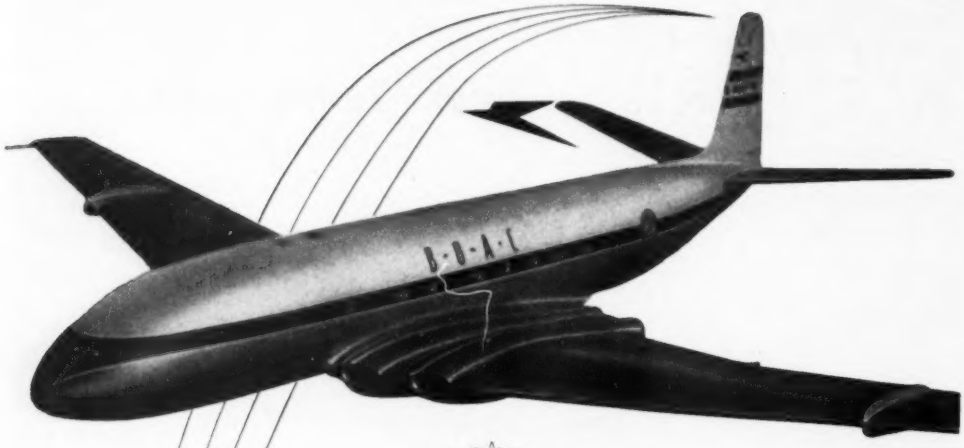
LIMITED

The Services offered by Airwork Ltd. cover every aspect of aviation from transport, flying training and aircraft servicing to aerodrome catering. The Company's activities are world-wide. Now Canadair Ltd. has appointed Airwork to be responsible for storage, overhaul, repair and maintenance of Sabre Jets in service with the R.C.A.F. in Britain. The contract is a high tribute to the scope and efficiency of Airwork Limited.

THE SERVICES OF AIRWORK

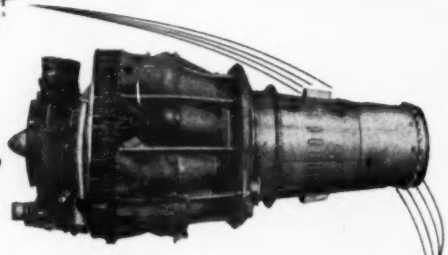
Air Transport Contracting • Servicing and Maintenance of Aircraft • Overhaul and Modification of Aircraft
Sale and Purchase of Aircraft • Operation and Management of Flying Schools and Clubs • Radio
Sales and Service • Insurance

AIRWORK LIMITED · 15 CHESTERFIELD STREET · LONDON W.1 · TEL: GROSVENOR 4841
Also at: Blackbushe Airport, Nr. Camberley, Surrey. Booker Aerodrome, Marlow, Bucks. Gatwick Airport, Horley, Surrey.
Langley Aerodrome, Bucks. Loughboro' Aerodrome, Dishley, Leics. Perth Aerodrome, Perthshire. R.A.F. Station, Digby, Lincs.
Royal Naval Air Station, St. Merryn, Padstow, Cornwall. Speke Aerodrome, Liverpool. Squires Gate Aerodrome, Blackpool. R.A.F. Station, Waddington



D·H ENGINES

One good trademark leads to another



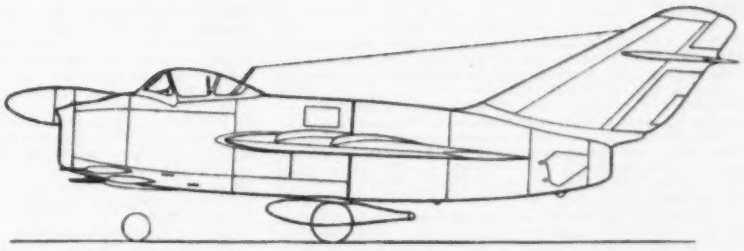
Every British aircraft gas turbine has rotor blades made of one or other of the Nimonic Alloys. The use of a Nimonic Alloy is an assurance of reliability in any component that must resist stress at high temperatures.

This is the Nimonic 90 blade that rotates in the Ghost engines that keep the Comets flying

Nimonic is a Registered Trade Mark.

HENRY WIGGIN AND COMPANY LIMITED

WIGGIN STREET · BIRMINGHAM 16



Believed to be designated Mig-15F, the all-weather version is equipped with a large A.I. scanner above the nose intake; this drawing also shows an additional container under the belly. In this form, the fighter approximates to the F-86D (single-seat, all-weather); a two-seat development is also in service, with increased span wings with rounded tips.

МИГ-15 . . .

considerable flexure. Outboard of the undercarriage there are two spars running at approximately 20 and 60 per cent chord; the rear spar continues to the fuselage in a straight line, but the front spar is angled forward at the undercarriage hinge to provide for the front wall of the wheel well; the front spar meets the fuselage at about 12 per cent chord. These spars are of light alloy, with plate webs and extruded booms forming an I-section.

There is also a third spar which runs diagonally from a point on the front spar just outboard of the landing gear perpendicular to the fuselage centre-line; this is also a light-alloy I-section, but has wider booms to transmit the wing bending loads.

Flaps are of the split Fowler type. Actuation is hydraulic, one cylinder in each wing operating its flap *via* push-pull rods and bell-cranks, the flaps running down track and roller assemblies to increase the effective wing area. The stressed-skin ailerons have internal mass balance and sealed aerodynamic balance; the use of such a pressure-differential balance allows a maximum effective control area, but limits the maximum surface movement. Aileron operation is by push-pull rods, which enter the wing at the leading edge; there is no power-boost.

Early Migs had slats on the outer leading edges, but these have apparently been abandoned. On the other hand, each wing now mounts two stall fences, each some 4in high, formed by riveting together two sheets of thin aluminium; they are riveted to the upper wing surface parallel to the line of flight. Critical-frequency flutter build-up is prevented by a pair of weights of about 60 lb each which are shaped to fit inside the leading edges near the wing tips; they are permanently riveted in place.

Tail construction follows that established by the wing. The very large fin employs two spars, the rear spar carrying the chief flight-loads. These loads are transmitted by a heavy steel frame which is built into the fuselage around the tailpipe at the same angle of rake as the fin rear spar. Both fin spars are I-beams with flanged lightening holes, the rear spar being of steel. Pressed light alloy ribs and stringers complete the structure, to which the skin is flush-riveted.

The tailplane has but one spar—a massive steel I-section, forged and machined—running at 25 per cent chord. This carries all shear and bending loads to a steel carry-through structure in the fin; torsion is shared by the spar and the forward fin attachment point. This forward attachment embodies a serrated plate which can be engaged with an indexing tooth in a number of positions to provide ground adjustment of tailplane incidence; there is no provision for actuation in the air. The tailplane halves are attached to each side of the fin by pivots, and are mutually connected by channel section members through which pass push-pull rods for elevator actuation.

Elevators and top and bottom rudders are all light stressed-skin structures, operated by a combined torque-tube and push-pull rod assembly within the fin. The lower rudder carries a steel-plate mass balance at its lower end, while the upper rudder is balanced by a weight housed in a fairing at the top of the fin. The elevators are unconnected; the port surface bears an electrically-actuated trim tab.

The main undercarriage legs are lever-suspension units; the air-oil shock absorber cylinders are hinged to the wing at their upper ends, the wheels being mounted on levers hinged to brackets on the lower ends of the cylinders. The units retract inwards hydraulically, the operating cylinders incorporating ball-locks for locking the undercarriage in the down position. The up-lock is mechanical, and includes a small release cylinder to free the legs by a small hydraulic jack. The large inner wheel doors are hinged to the wing root and are operated by their own hydraulic jacks, sequenced to the wheel-retracting system.

The mainwheel tyre size is 26 x 6.6in, and the inner tubes are made from a mixture of natural and synthetic rubber. The brake assemblies are of the two-shoe type, each shoe being actuated by its own cylinder. The nosewheel retracts forward, without rotating, to lie in the space between the inner walls of the engine air ducts.

An emergency pneumatic system is provided for flap and undercarriage operation, supplied from pre-charged air bottles. This is, apparently, a "single-shot" system.

The RD-45 engine now used on the Mig-15 represents an appreciable advance on the Rolls-Royce Nene of 1947, the independent work displayed affording an interesting comparison with similar developments—on the same engine—by Rolls-Royce, Pratt and Whitney, and Hispano Suiza.

Materials used in the RD-45 are generally reported to be of good quality. Nimonic 80 and 75 have, apparently, been produced in Russia for the turbine blades and combustion chambers respectively. Many parts of the engine employ titanium-stabilized stainless steel, particularly around the fuel burners.

The compressor is a normal-looking double-sided centrifugal unit, 28.8in diameter, with 29 machined radial vanes. Aluminium alloy is used for the compressor, and for the 17.7in diameter guide vanes on each side. The compressor is housed in a typically Nene light alloy casing, attached on each side of the diffuser by bolts. The nine combustion chamber assemblies each consist of a cast light alloy cover, a chamber of aluminium-sprayed steel and a Nimonic 75 flame tube. Improvements over the original Nene are given as the inclusion of an additional row of perforations in the primary mixing portion of the flame tube; the reinforcing of this section with welded rings; use of heavier metal gauges; and, most importantly, an increase in cross-sectional area of 15 per cent, and the use of a new pattern of duplex burner.

To accommodate the increased mass flow, the turbine blades and guide vanes are some half-inch longer and quarter-inch broader than those of the Nene, while the tailpipe area is up by about 30 per cent. Engine weight has increased to about 2,000 lb (up by 285 lb), although the overall diameter has been held at the standard 49.5in.

Thrust Increase

No afterburner is fitted to the standard Mig, although the rear fuselage permits a short afterburner to be installed if necessary. Water injection, however, is fitted as a standard feature. With it, the RD-45 gives about 6,750 lb thrust, the dry thrust of 6,000 lb already representing a gain of 1,000 lb over the Nene.

The RD-45 burns kerosene, and has a specific fuel consumption of 1.14 lb/hr/lb thrust. Engine controls are similar to those on British Nene-powered aircraft; it is interesting to note that the throttle quadrant embodies a cam-operated microswitch at the full power position, but on the aircraft examined, this was not in use. Engine accessories include dual fuel pumps, tachometer, generator, oil sump and filters, barometric fuel valve, auxiliary gear-box drive, and electric starter. The two flame igniters use H.T. plugs.

Fuel is carried in one, two, or three centre-fuselage tanks, with a combined capacity of 330 gal. Most Mig-15s have provision for underwing jettison tanks of similar shape to those used on the Mosquito, each with a capacity of about 160 U.S. gall. The main fuselage tanks house float-type gauges which actuate sliding potentiometer contacts.

The standard armament of the Mig-15 is two 23 mm NS cannon below the port side of the nose and one 37 mm N cannon on the starboard side. Both guns are identical in general layout, mounting and ammunition feed.

The 23 mm weapons, with their electro-pneumatic valves for controlling the charging and feed-assisting cylinders, each weigh 87.5 lb. The overall length of these cannon is 78.25in. The ammunition is fired by a centre-fire percussion cap; the breech of the gun is locked at the moment of firing by the bolt-head being rotated one-quarter turn in curved guides in the body. Operation is by recoil and hydraulic buffers and pneumatic feed-assistance is used. Firing is controlled by an electric solenoid.

Open link ammunition (which was beginning to come into use

МИГ-15 . . .

with the Luftwaffe in 1944-5) is used, the links being stripped before the rounds enter the feedway of the gun. The gun mounting consists of a front trunnion, and an adjustable rear mounting consisting of a block and stud assembly attached to a frame threaded on a horizontal post; harmonizing is accomplished by moving the post vertically and screwing the block horizontally.

Ammunition boxes for both calibres of gun are of welded light alloy with leather handles; those for 23 mm rounds are 20 x 10½ x 8in, weigh 9 lb 2 oz empty, and hold 80 rounds. Cases and links are ejected through separate chutes below the breech and feedway of each gun.

The cockpit is pressurized by tapping from the elbow leading to No. 1 combustion chamber on the engine. The maximum pressure differential is about 4 lb sq in, and this is probably reduced before engaging combat. A pilot oxygen system is fed from bottles at 2,000 lb/sq in.

Instrumentation is adequate. Double-galvanometer movements are used to indicate volts and amperes, and a triple-unit provides fuel pressure and oil pressure and temperature. The master unit of the radio compass is installed 5ft from the tip of the starboard wing. A remote radio compass indicator is provided, fed from a transmitter installed 5ft in from the tip of the starboard wing. On the left-hand side of the cockpit is mounted a control pedestal on which are positioned: engine power lever; flap lever; dive brake control; a circuit-breaker panel for the starting and ignition systems; fire extinguishing controls; and volume and tuning controls for the radio communication receiver.

On the forward wall of this console is mounted a small panel bearing one fire-warning light (actuated by a number of sensing elements in various stations on the airframe) and two actuator buttons controlling a two-shot extinguishing system. A smaller console is mounted on the starboard side of the cockpit carrying most of the radio controls, and the pneumatic valves for the emergency operation of the landing gear and flaps.

As this description refers to a fairly early Mig-15, no radar or IFF is mentioned. But the radio equipment is otherwise comprehensive and is described as being of very high quality, both in design and manufacture. The communications receiver is designated RSI-6MI; it is a conventional eight-valve superhet., fed from the main aircraft 24-volt electric system. The aerial is of the fixed wire type attached to a raked mast at the rear of the cockpit canopy. It is controlled by a remote tuning unit, the continuous frequency range being 3.75 to 5.0 mc/s.

The radio homing receiver, known as the type RPKO-10M, is a nine-valve superhet. operating between 270 and 740 kc/s, with a sensitivity given as 5 microvolts. The power supply is taken from a dynamotor (type RU-11A), and the associated aerial is a streamlined flat loop with an iron core.

Mig-15 DATA

Span, 33ft 1¼in; length, 36ft 4in; height, 11ft 2in.

Wing: gross area, 255 sq ft; thickness/chord ratio, 11 per cent throughout; sweepback at leading edge, 42 deg.; dihedral, —3 deg.

Tail: tailplane span, 14ft 10in; sweepback (leading edge of all surfaces), 42 deg; thickness/chord ratio (all surfaces), 8 per cent.

Airframe limiting Mach number: 0.89.

Weights: empty, 8,320 lb; fuel, 2,380 lb; oil, 18 lb; pilot, 198 lb; ammunition, 352 lb; combat weight, 11,268 lb. External load: jettison tanks and fuel, 1,870 lb; rockets or bombs, 1,100 lb; maximum all-up weight, 14,238 lb.

Performance: maximum speed, 584 knots (672 m.p.h.); stalling speed, 95 knots (109 m.p.h.); initial rate of climb, 10,400ft/min; service ceiling, 51,000ft.

FROM THE CLUBS

THE Twelfth International Air Rally of the Chateaux of the Loire and Wines of Touraine, held at Tours on July 5th and 6th, proved a resounding success for the recently formed Penguin Flying Club of Gatwick.

Six "Penguins" flapped across the Channel on the Friday evening; they were D. G. S. Cotter in G-ALYD, Peggy Grace in 'GXJ, R. Pawley flying 'HKO, R. Hume in 'HSB (all Austers), Lt-Cdr. J. S. Sproule in his Piper FSZ and H. Best-Devereux in another Piper variant, 'LGH. With these six pilots went a further eight members as passengers; all machines flew separately in order to give the crews who were new to the route the maximum exercise in navigation. Mr. Pawley did particularly well considering a total of only fifty hours in his logbook.

On arrival in the Tours area, competitors had to count carefully placed barrels in vineyards and note certain ground signals displayed in the gardens of the various chateaux. This competition was won by David Cotter, C.F.I. of the Penguins, who gained the maximum points possible and arrived within half a second of the E.T.A. arranged by the Tours club. His performance, rewarded by a handsome trophy, the Coupe Cempa, was closely rivalled by that of Peggy Grace, who received the Coupe Féminin.

The club as a whole won the Coupe du Conseil General d'Indre et Loire (for sending the greatest number of aircraft from any one club) and, in addition to the trophies, was presented with some seventy bottles of the local wine—which doubtless provided the members with some practice in calculating cs. of g. for the return flight.

THE 30-hour course of flying instruction which was offered by Mr. G. Scott-Pearse of the Strathtay Aero Club to the winner of a draw (which took place on June 30th) was won by Mr. J. G. H. Fenton, who received his first lesson at Scone airfield from Mr. D. Kay, the C.F.I., shortly afterwards.

FLYING time for the Strathtay Aero Club during June amounted to 105 hr 5 min. Four club members and two A.T.C. cadets qualified for their P.P.L.'s, bringing the total output of qualified pilots for the past year to 43. The club is at present operating a depleted fleet, consisting of only a Tiger and an Auster, but more aircraft will probably be available shortly.

NEWS comes this week from the Tees-side Flying Club, which operates from the airport at Greatham, West Hartlepool, and whose vice-president, incidentally, is Tom Hayhow. The fleet consists of two Autocrats, an Auster J.4, a Magister and a Proctor, and there are three flying instructors. During the summer, Tees-side have been holding numerous original flying events and the season's programme includes such items as precision-circuit and treasure-hunt competitions, lunch patrols and spot-landings. Aviation films and lectures will again feature in the autumn programme, and an announcement of the annual dance will be made later.

THE Wiltshire Flying Club's total air time for June amounted to 346 hr, thus bringing their total for 1952 to 1,376 hr as compared with 1,153 hr for the corresponding period last year. This again seems to be a record figure and it would be interesting to know if any club can beat it.

During the month of June the de Havilland Flying Club have been very active at Thruxton. The first member to join, Mr. Parker—who started his flying on May 17—obtained his P.P.L. on June 20th. Messrs. Amey, Hancock, Williams and Elphick have all gone solo and are well on the way to obtaining their P.P.L.'s.

On Monday, August 4th, at 1.30 p.m., the Wiltshire Flying Club is holding a motor-sport meeting at Thruxton.

THE Blackpool and Fylde Aero Club has logged some 600 hours' flying this year. It operates a fleet of six Austers and one Magister—the latter machine being kept solely for the training of the club's A.T.C. cadets. Of the 250 members, some 120 are actively flying. Here is another club which for some time has been training pupils under the firm's flying scheme; employees of three concerns—the Loxam Group, English Electric and de Havilland—are able to receive flying instruction for only 15s per hour. The solo rates for ordinary club members are £2 15s solo and £3 dual. Ten members, including three A.T.C. cadets, have obtained their P.P.L.s this year, and several more are now under training.

FORTHCOMING EVENTS

July 26.	Royal Engineers' Flying Club: Air Day, Rochester.
July 27.	R.A.F. Golfing Society: Match v 2nd T.A.F., Bad Eilsen.
Aug. 2.	"Daily Express" Challenge Trophy Race.
Aug. 2-3.	"ILSY" Air Display, Ypenburg.
Aug. 3-4.	S.M.A.E.: National Model Aircraft Rally, R.N. Air Station, Gosport.
Aug. 13-17.	Nordic A/2 Models Contest, Austria.
Aug. 15.	Aero-Club de Charente Maritime: Laleu and La Rochelle Air Meeting.
Aug. 15.	Ailes Montluconnaises: Rally.
Aug. 16.	Aero-Club de Vendee: Sables d'Olonne Rally.
Aug. 16-17.	Bembridge and Sandown Aero Club: Rally.
Aug. 23.	Coventry Aeroplane Club: Air Day and Siddeley Challenge Trophy Race.
Aug. 23-24.	Aero-Club de Trente: Dolomites Circuit.
Aug. 30.	Midland Aero Club: Display.
Aug. 30-31.	U.S. National Air Races.
Aug. 31.	A.B.A.C.: Summer Convention.
Aug. 31.	S.M.A.E.: British Model Championships, College of Aeronautics, Cranfield.
Sept. 7.	Scandinavian Air Rally.
Sept. 1-7.	S.B.A.C. Flying Display and Exhibition, Farnborough.
Sept. 7.	"Yorkshire Evening News" Model Flying Festival, Sherburn-in-Elmet.
Sept. 15.	Battle of Britain Day.
Sept. 15.	I.A.T.A.: Eighth Annual General Meeting, Germany.
Sept. 17.	Golf: R.N. and W.R.N.S. v. R.A.F. and W.R.A.F., Camberley.
Sept. 20.	R.A.F. At Home Day.
Sept. 21.	S.M.A.E.: Models Contests, Butlin's Holiday Camps.
Sept. 28.	Aéro-Club de France: Coupe Stemen Helicopter Competition.

THE COMMONS DEBATE

Second Thoughts on Civil Aviation

ON July 16th the House of Commons debated the Government's recently stated policy towards civil aviation. The general trend of the discussions followed those held by the Lords a month previously; Government spokesmen reiterated their views on limited concessions to private operators coupled with continued support to the Corporations, and the Opposition speeches were, in the main, variations on the theme that the new policy threatens the well-being of the State airlines.

MR. FRANK BESWICK (Lab. Uxbridge) took the expected Opposition line in opening the debate by stressing the "uncertainty and alarm" which the Government's policy statement had aroused. He particularly stressed the question of Scottish services, suggesting that not only would it be in the national interest that these services should remain in public ownership and control, but that B.E.A. should be given a direct subsidy for their operation.

Referring to the private Safari service to East Africa, he said that although it was entirely within the letter of the international agreement, he had been advised that the operators were already breaking the spirit of that agreement by attracting traffic from adjacent Belgian territory and, in fact, under-cutting both Sabena and B.O.A.C.

Mr. Beswick agreed that the C-rate services represented an entirely new era in air transport, but insisted that they should be developed on a planned basis. He doubted if B.O.A.C. would have ordered the Comet if they had known that, as from a certain date, the development of new overseas scheduled services would be open to the Corporations and to independent companies alike.

He commended the decision to step-up production of aircraft types already ordered, but thought Lord Swinton had been guilty of complacency in putting the view recently that we had collared the jet markets for generations ahead. The fact was that to maintain our lead we urgently needed a new aircraft by 1958 at the latest. Particularly was there a need for an entirely new, bigger and better machine which would transport over the Atlantic about 150 passengers at a time. Such a machine would have to emphasize reliability, range and economy of operation, plus the greatest possible volumetric capacity even, if necessary, at the expense of speed. There was also a requirement for a machine heavier than the Viscount to deal with mass travel on short routes.

Mr. Beswick said there was much to support the suggestion that a new Brabazon Committee should be appointed to focus the requirements of the new aircraft. But even if such aircraft were clearly defined, the Corporations could not be expected to place the original production orders if they did not know exactly where they stood.

MR. ALAN LENNOX-BOYD, the Minister of Civil Aviation, said that two main assumptions had to be made in regard to civil aviation. The first was that we were on the verge of a great air age in which there could be no turning back, and the second that, while we must at every stage be certain that we got value for money, we must be as careful as possible not to lose the lead in civil aviation which we were undoubtedly enjoying.

It was hoped that our achievement could be matched in other fields, not least in that of helicopter development. He hoped that before long there would be an opportunity of seeing helicopters at work in the heart of London and of making the public more than ever conscious of the role these machines had to play. This was but one aspect of the new air age. Last year the London area handled 1,619,000 passengers, of whom over 1,500,000 passed through London Airport and Northolt—compared with 1,250,000 through Dover.

Scheduled services, said Mr. Lennox-Boyd, had increased enormously, and the assumption was that they would be doubled by 1960. Passengers handled by London area airports had doubled since 1948, and it was expected that they would have doubled again by 1960. If the evidence of the North Atlantic tourist traffic, for which there were already heavy bookings, was any indication, not only would there be little diversion from the normal type of travel catered for by the Corporations, but the opening up of the tourist service with Europe, France, Italy, Switzerland, and Malta would lead to a huge increase in tourist-class traffic.

He then dealt with charter operation. This was really a problem for B.O.A.C., as B.E.A. associates did little charter work. Even so, B.O.A.C. had only two subsidiaries, and only five aircraft were involved—three Doves and two Dakotas. He had been assured by the chairmen of both Corporations that they had no expansionist aims whatever in the field of charter work for their subsidiaries.

No one would be resentful, of course, if the two Corporations used their aircraft for charter work during the off-seasons when there was no other employment for them.

He did not think there was much substance in the suggestion that the overheads were not fairly charged against charter operation. It was true of B.O.A.C. and by and large of B.E.A., that the only item of overheads which was not charged against charter services which was charged against scheduled services was technical training and development, which it would be quite impossible to split up actuarially between the various activities involved.

Mr. Lennox-Boyd then turned to the vexatious question of internal services. He was sure that a number of people, not least the chairman of B.E.A., would regard an opportunity of divesting themselves of some of these services as "not altogether unwelcome"—provided they felt sure that the services would be adequately looked after in any change that might be brought about. It would be unthinkable, he stressed, that a larger subsidy would be paid to a private operator than was paid to B.E.A., or that the subsidy should continue to be paid to a private firm longer than it would otherwise be paid to a Corporation.

He agreed there was a strong social need for the Scottish services, but commented that B.E.A.'s welcome plans to substitute, this winter, Pionairs for the DH 89s, save for their ambulance service to the island of Barra, would still leave untouched the needs of a large number of Scottish islands. He did not think anybody could be indifferent to the needs of these islands and the large potential traffic that services there might carry. He was therefore greatly interested in the work that Group Capt. McIntyre of Scottish Airways had done and the research that they had carried out into the possibilities of the Pioneer and twin-engined Pioneer. There might well be a field here where an agreed settlement could be evolved which, while preserving for Scotland all she had got through B.E.A.'s hard work, might give here in time even greater opportunities.

He added that Mr. Beswick was also mistaken in claiming that an offer involving a subsidy of £100,000 a year—had been made to a Scottish firm. Talks were going on, and he would still be glad to hear from anybody with the necessary financial backing and skill. If no offers were forthcoming, naturally the existing operators would continue. Nor would any offers be accepted unless those concerned could give similar or better service at no greater cost to the taxpayer.

Dealing with the suggestion that the C-rate services would compete adversely with the international fare structure set up by I.A.T.A., Mr. Lennox-Boyd admitted that if one flew from London to Johannesburg and was prepared to change at Nairobi—using the private companies—it would work out more cheaply than by going direct by B.O.A.C. In the same way, for the last two years it had been cheaper to travel by the French airline and to break the journey to Hong Kong at Saigon. This was following a pattern which France and Belgium had followed for the past two years. It was in no sense breaking an international agreement. The Government had decided, however, in cases where the exercise of our cabotage rights took us across foreign territory, to limit the frequency of these operations to what was the reasonable requirement of the colonial territory concerned; to fix fares at much less than the superior fares guaranteed and protected by the I.A.T.A. agreement; and to exclude from the operators the right to pick up and set down traffic from foreign territories with whose Governments we were in bilateral agreement.

Mr. Lennox-Boyd reiterated the Government's strong belief that there was a huge opening for private operators in the field of freight development. The chairman of both Corporations had authorised him to say that they would not apply to A.T.A.C. for all-freight services on any new routes for one year, unless considerations of national importance required them to do so.

MR. DUDLEY WILLIAMS (Con. Exeter) and MR. GEOFFREY DE FREITAS (Lab. Lincoln) both made references to the axial-versus-centrifugal controversy; their remarks, though interesting, do not refer directly to the question under debate, and are referred to on page 107.

Four Freedoms

MR. CHARLES IAN ORR-EWING (Con. Hendon N.) said there were four specific reasons why greater freedom should be given to civil aviation. First, there must be a merchant fleet of the air. The second reason was that we badly needed a pool of reserve aircraft should emergency arise; thirdly, greater stability was needed in the aircraft industry and some extra employment for ex-R.A.F. crews.

Finally, there was need for competition, not in providing luxury services, but in getting costs down.

Dealing with freight, Mr. Orr-Ewing noted that B.E.A. had lost £80,000 on their operations; so it could not be called a disservice if that sphere of activity were taken away from them.

He noted that B.E.A.'s freight costs were 27.4d per capacity ton mile: the rate in the States was just half that amount for carrying freight.

MR. JOHN TAYLOR (Lab. W. Lothian) claimed that Opposition suspicions about what was proposed for the Scottish internal services had now become certainties. It appeared that the long-term lobbying over a period of years which had been going on behind the scenes for the future of Scotland's internal services had been successful. It was suggested that these services—except the one connecting Scotland with the Channel Islands—should be handed over to private operators. That would be bad enough, but it seemed that the Government proposed to hand them over to a single operator, Scottish Aviation Ltd.

MR. WALTER ELLIOT (Con. Kelvingrove) thought Mr. Taylor's remarks on Scottish Aviation, Ltd., had been motivated by sheer political prejudice. The suggestion that there should be a development of civil aviation in Scotland under the same people who pioneered and developed it there was not an unworthy one, said Mr. Elliot.

MR. MAURICE EDELMAN (Lab. Coventry N.) stressed the need for a dual-purpose freight aircraft which would be acceptable to the independent operator and yet be adaptable for strategic use. He did not think a service employing such aircraft would be possible without some measure of subsidy.

MR. JOHN GRIMSTON (Con. St. Albans) said the air service market was more susceptible to increases through lowering of costs and prices than almost any other market in the world. This trend had been much in evidence in the United States where 55 companies operating coach services last year flew 765 million passenger miles with a total revenue of 40 million dollars.

If the charter people, he said, were not allowed to provide low-cost services, those which were provided would not be sufficiently cheap to enable the people who wanted to do so to fly.

On the basis of U.S. airline-cost research, said Mr. Grimston, it was interesting to note that B.O.A.C. offered something like six times the

(*Continued at foot of page 108*)

CIVIL AVIATION

THE DESERT LANDING

THE following statement was issued by B.O.A.C. on July 19th. "The committee of inquiry appointed by the chairman of B.O.A.C. to investigate the circumstances of the landing off-course of Hermes G-ALDN near Aioun Legbar, in French West Africa, on May 26th, has completed its proceedings and reported, and as a result the services of the captain and the first officer concerned have been summarily terminated.

"There were no fatal casualties among the passengers, but the Corporation regrets to report the subsequent death of First Officer E. M. Haslam, the second pilot of the aircraft, which occurred as a result of exposure to desert conditions.

"The Corporation is considering suitable recognition of the exemplary conduct of the first steward, Mr. L. H. Smee, and the stewardess, Miss M. Osborn."

It is not expected that the findings of the committee of inquiry will be published, but the dismissal of two members of the flight crew (and statements subsequently attributed to them) confirm the generally held belief that the accident was caused by an extreme error in navigation. Pending the results of official investigations, the commercial licences of the officers concerned, Capt. R. Langley, D.F.C., and 1st.Off. T. de Nett, have been temporarily suspended by the M.C.A.

MORE AUSTRALIAN TRAFFIC

AUSTRALIAN airlines flew 14.5 per cent more passenger-miles on domestic services last year than in 1950; the number of passengers carried during the same period rose from 1,600,000 to 1,820,000, and the passenger load-factor increased from 62.7 per cent to 67 per cent. On international routes, the number of passengers carried last year by Australian operators was 45,833, compared with 32,077 in 1950. At the same time the passenger load-factor went up by 10.1 per cent to 66.5 per cent.

AMERICAN CRYSTAL-GAZING

IN a recent address, Mr. William Hogan, a vice-president of American Airlines, made some guarded observations on the future outlook both for his company and the airline industry in general. The outlook for traffic and revenue, said Mr. Hogan, was good—at least for the near-term future. Other points included in his remarks were as follows :—

"The expense trend is upward, and, even though costs are more rigidly controlled, money for the increases must be covered by rate and fare adjustments. Most of the [U.S.] trunk lines are no longer in the subsidy class, but careful rate and fare administration will be required to keep them out of subsidy. The credit of the industry is not as good as we should like to see it, and we need at least five years of good earnings to firmly establish that credit. . . . Capital commitments by the [American] industry for new flight equipment total about $350m (£125m) for delivery by 1954."

Mr. Hogan believed that American introduction of regular turbojet and turboprop transports would not take place until the end of this decade, but it would bring a new surge of re-equipment orders, requiring perhaps another $350m. The growth of freight traffic, he said, would be relatively slow and tedious.

"Flight" photograph

HOLIDAY ATMOSPHERE : As reported on page 108, Jersey Airport held an air display last week to mark the opening of the new 1,400yd tarmac runway. The public enclosures were packed with over 20,000 visitors; here, in a quieter part of the airport, is a view of the B.E.A. Elizabethan which took part, and a distant glimpse of the aerobatic Aiglet demonstrated by Ranald Porteous.

NEWS FROM SOUTH AFRICA

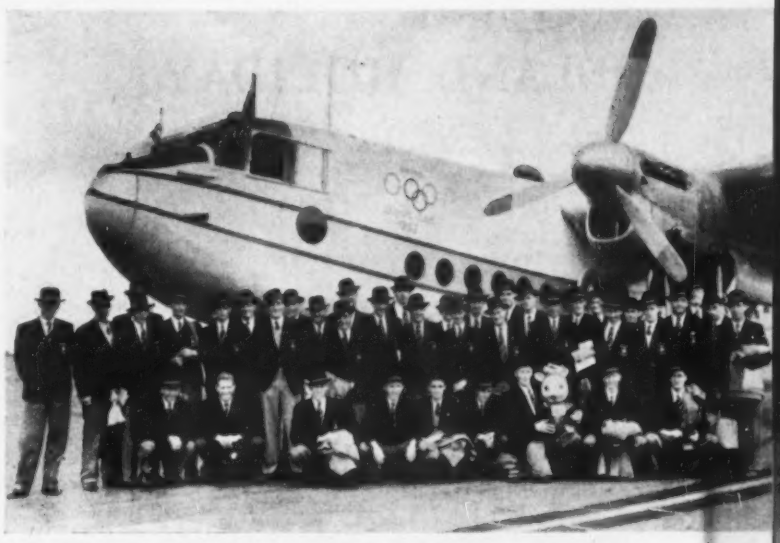
INDIRECT financial aid for South African airlines, rather than a subsidy, is recommended in the report of the South African National Transport Commission. Customs duty on aviation fuel, states the report, should go into a national civil aviation fund. It also advocates the operation of additional services between the Union and Europe by South African companies, and recommends that emphasis should be placed on the encouragement of new routes to the Americas and to Australia. Other recommendations include improvement of communications and navigational aids, and the adoption of an "airways" type of traffic-control system.

Good progress is reported with the construction, 12 miles from Johannesburg, of the new Jan Smuts Airport. Since May 1st, the 10,500ft by 200ft "Great Trek" runway has been used solely by B.O.A.C. Comets taking-off for London, but arriving Comets still land at Palmietfontein and are then ferried, minus passengers, to Jan Smuts.

The airport is built on a large natural watershed, with few trees anywhere near. Four large hangars are already being roofed, of which the largest are twin buildings of 175ft by 125ft. Two subsidiary runways, each of 8,450ft, have been laid out at 60 deg to the main strip, and these are now in the process of "firming-up."

All the international airlines now using Palmietfontein Airport are looking forward to the opening (possibly next January) of the Jan Smuts Airport, which will relieve the cramped condition under which they are at present operating. Normally the Palmietfontein strip of 6,500ft would be adequate, but the altitude is combined with high temperature at certain times of the year, and the airfield becomes unsuitable. Qantas are particularly interested, in view of their plans to inaugurate a direct Johannesburg-Sydney

BEALINERS : Among the several B.E.A. executives who attended the Jersey display were (left to right) : Mr. Peter Masefield, chief executive; Capt. J. W. G. James, director of flight operations; Mr. J. M. Keene-Miller, Channel Islands manager; and Mr. A. H. Milward, controller of operations. "Flight" photograph



A FLYING START to the athletic efforts of Britain's Olympic team was given by this York of Lancashire Aircraft Corporation. The company is carrying the entire British team and the Canadian horse-team; its Yorks are making some 20 flights to Helsinki from Bovingdon.

service on September 1st. During the next few weeks, work will begin on the installation of landing beacons, radio direction and range-finding apparatus at Jan Smuts Airport.

Work is also going ahead at Durban, where, following successful completion of the six-year task of diverting the Umlaas River, final construction of the city's new airport at Lamontville is now being accelerated. At one time the Umlaas used to meander across the track of the projected 6,800ft main runway, but it has now been re-channelled into a specially constructed 2½-mile concrete-lined canal; The latter is 240ft wide and 15ft deep, and has involved the removal of over 5m cu yd of soil and rock from a formidable range of hills known as the Bluff.

Aircraft are now using one half of the new bitumen-surfaced main runway and the whole of the No. 2 grass runway. The north end of the bitumen strip has been provided with a 300ft by 200ft concrete touch-down point, mainly to avoid possible damage to the tarmac by jet-powered aircraft.

The temporary buildings which have been in use at Lamontville for the past two years are expected to have been replaced by the end of next year. By making the best possible use of its uncompleted airport, Durban has enjoyed the service of four-engined aircraft since 1950—three years before scheduled completion of the work.

CENTRIFUGALS OR AXIALS?

SPEAKING in the House of Commons during the debate on civil aviation reported on page 105, Mr. Dudley Williams (Con., Exeter) maintained that the adoption of axial-flow Avon turbojets for the Comet II was "a retrograde step." He understood that the tendency to place the emphasis on axial-flow types did not receive the support of Sir Frank Whittle, and he thought the Government were unwise completely to ignore Sir Frank's advice—just as they had done in 1936. Mr. Williams also criticized the B.O.A.C. order for Britannias; he was sure that if the Corporation persisted in following up their purchase of these aircraft they would soon find themselves in the red again.

Mr. Geoffrey de Freitas (Lab., Lincoln) took up the argument by suggesting that axial-flow engines might continue to be required for civil aircraft, but that centrifugal turbojets were more suitable for military types. Inevitably, logistics would demand that the military must have centrifugal units; this would produce a large production demand. But if it were decided that axials were more suitable for civil aircraft, the Minister should not be stampeded into sacrificing civil-aviation requirements to those of the fighting Services. We would never require more than scores of purely civil type aero-engines, whereas vast numbers of centrifugals would be needed.

BREVITIES

LIKE B.O.A.C., Air France made its first profit last year. The French operator's report for 1951, just published, shows that nearly one million passengers were carried during the year, compared with 770,000 in 1950. Turnover was £32 million (compared with £26 million in 1950), of which £52,000 was profit.

* * *

Further helicopter tests are to be made over London's South Bank Site by B.E.A. during the next few weeks, using a Bristol 171. The aircraft will not land and the main purpose of the experiment is to enable noise-levels to be measured.

* * *

A colonial civil aviation conference is to be held in London after the S.B.A.C. display and exhibition. Items to be discussed during the conference, which will begin at the Colonial Office on September 8th, include the supply of aircraft, progress on airports, the relationship between scheduled and irregular services on colonial routes, and search and rescue facilities.

* * *

Mr. Thomas MacDonald, the New Zealand Minister of Civil Aviation, stated last week that his Government had reversed its pre-election policy of selling New Zealand National Airways "lock, stock and barrel" to private enterprise. He said that the original plan had been followed up, but that there had been no private applications to buy the airline. Investigations had also been made into the possible introduction of private capital, but that no practical method of doing so had been evolved.

* * *

During the five-week period which began on July 18th, the scheduled flights of Aer Lingus are reaching their peak—some 650 services weekly. The average daily number of Dublin-London return flights is now 16, of which four are cut-rate "Starflights"; these nightly services have now also been introduced on the Dublin-Manchester route. The company is also operating regular services between Dublin and Liverpool, Birmingham, Edinburgh, Bristol, Cardiff, the Isle of Man, Jersey, Amsterdam and Paris.

* * *

Swissair have been given a contract by the American authorities in Germany for periodic overhaul of Dakotas, to be carried out in the airline's workshops at Cointrin, Geneva.

* * *

Although the fuel shortage forced Central African Airways to curtail its services by one-third during the latter part of May, the total traffic carried by the company during the month was 37 per cent greater than in May 1951.

* * *

The Butler Air Transport Company of Australia is reported to have ordered two Herons for replacement of the Rapides used on its feeder services in New South Wales; the first Heron is expected to be in service by the end of the year.

* * *

The recent ruling by the Australian Department of Civil Aviation that all airliners should be fitted with rearward-facing seats has evoked protests from operators that heavy costs would be involved in converting aircraft interiors—as much as £100,000 in the case of a Constellation. Airlines have now been told to submit their objections to the order in writing, together with estimates of conversion costs; meanwhile the order has been suspended.

* * *

Hunting Aerosurveys, Ltd., have been awarded a contract by the Crown Agents for the Colonies for photography of up to 25,000 sq miles in British Guiana and 1,250 sq miles in Jamaica. The survey, which is due to begin in August and will continue for a year, will be made with a Lockheed 14 based at Atkinson Field, Georgetown. The pilot and manager of the four-man expedition will be Mr. H. F. Warwick.

ISLAND HOLIDAY

Jersey Airport Stages a Notable Air Display

Long queues formed to inspect B.E.A. aircraft displayed at Jersey Airport, among them this Dart-powered Dakota—one of the two used on regular freight services. "Flight" photograph

TO celebrate the opening, last May, of a new tarmac runway, which will greatly increase the usefulness of the island's airport, the Jersey Harbour and Airport Authorities staged an excellent air display on July 17th. The event was to have been held at Whitsun, but was postponed by the aviation-fuel shortage. An indication of the growing importance of the airport is the fact that, despite the shortage, it handled 18,748 passengers during May alone—an increase of 44 per cent on the figure for May, 1951.

Situated at St. Peter, five miles from St. Helier, Jersey Airport is under Channel Islands' administration. Its commandant, Mr. C. Roche, has been in charge there since 1939; during the war, of course, the Luftwaffe relieved him of his duties, and from 1942-45 he was interned in Germany. The benefit of the new runway (which is of tarmac, 1,400 yd long by 50 yd wide) will be felt mainly in the winter, as drainage of the former all-grass surface had been restricting movement of the larger aircraft. Now the airport is able to handle the latest types of medium-range airliner.

B.E.A., in fact, sent an Elizabethan there to take part in the display and to give a demonstration flight round the island to local dignitaries and officials. Flown by Capts. Ross and Hadley, the Elizabethan (G-ALZV *Earl of Leicester*) carried a full load of passengers on its outward journey from London Airport; its time for the 200-mile journey was one hour. Other B.E.A. machines at Jersey were Pionairs (which fly the regular services to the mainland), Islander-class Rapides, Dart-Dakota G-ALXN *Sir Henry Royce*, and Viking G-AMNJ *Lord Fisher*. The Corporation's chief executive, Mr. Peter Masefield, arrived in the Viking, the first of the new 32-seat tourist versions.

All these types were displayed in a static park at Jersey, where they were inspected by a remarkably air-minded crowd some 20,000-25,000 strong. The secret of the visitors' enthusiasm lay in the fact that mainlanders had arrived in Jersey by air, while the islanders, for their part, took full advantage of the various local services and those to France, England, and Ireland. The main routes, incidentally, are operated by B.E.A. (in association with independent firms, notably Cambrian Air Services) and Aer Lingus.

Another highspot in the static park was a camouflaged Bristol Sycamore from the Army helicopter flight at Middle Wallop—the first helicopter ever to visit the Channel Islands. Piloted by Major B. E. M. Repton, it had made the 130-mile crossing from Eastleigh two days previously at a speed of 86 m.p.h.

Further contrast was provided by Mr. Tom Hayhow's immaculate yellow Aiglet *Liege Lady* (newly bedecked with painted flags as souvenirs of its owner's recent "record round-up") and a Vampire 5 of No. 72 Squadron. Four other Vampires had arrived for the display; their leader (S/L. D. L. Harvey, O.C. Flying at North Weald) told us that he had been robbed of the honour of taking the first jet to Jersey by an unnamed American pilot who, in 1945, had safely set down on the grass an unserviceable Me 262.

Throughout the flying programme, Rapides and Pionairs were taking-off from and landing at Jersey, lending a businesslike air to the otherwise festive proceedings. First to demonstrate were the Elizabethan and Dart-Dakota (Capt. A. S. Johnson), both of which made impressive low runs on asymmetric power. Visitors were then treated to the tantalizingly brief spectacle of two No. 617 Squadron Canberras (one tip-tanked) which arrived in the circuit, made two or three dashes across the airport and thundered away towards their base, almost before one could say "dambust." Auster's Ranald Porteous delighted the crowd with his deft and dashing show of aerobatics in the Aiglet Trainer; occasionally he flew straight and level between loops, stall turns, spins, slow rolls and flick rolls. Next in the air were four Vampires of 72 Squadron, piloted by S/L. Harvey, F/L. James, Maj. Browne (U.S. Marine Corps, attached to the R.A.F. as squadron-commander) and Sgt. Joachim; their formation act was followed by the Sycamore, in which Maj. Repton demonstrated all the remarkable tricks associated with helicopters, including the "rescue," or transfer of one volunteer from *terra firma* to a swaying rope-ladder.

The display timing was excellent, and immediately after F/L. Clayton completed his lively demonstration of Vampire individual aerobatics, Porteous and Hayhow took off with their Aiglets. The former placed parachutist "Dumbo" Willans neatly in the centre of the airfield, and Hayhow brought his Aiglet over the same spot soon afterwards by way of proving the efficiency of his Navigator (the Decca type). Having flown away from the island, he thereafter concentrated on greens and purples to find his way back on time and course.

Kindly co-operation from the U.S.A.F. brought Jersey's air day to an almost-supersonic conclusion. In quick succession came a series of accurately-placed fly-pasts low along the new tarmac by four Thunderjets of the 20th Fighter-Bomber Wing, four Tornado jet bombers of the 47th Wing and, finally, four glittering Sabres of the 81st Fighter-Interceptor Wing.

THE COMMONS DEBATE (Concluded from page 105)

maximum economic capacity, and B.E.A. offered something like twice. Where there had been independent research of the most economical side of airlines, it had been shown that both Corporations were very much bigger than the economic size would be expected to be. He repeated his view that two nationalised airlines was by no means the right number, but that something like five would be found to be the proper number in the long run—and running parallel with them would be the free enterprise firms, operating additional service at much lower cost than could be attempted by the big people.

G/C. C. A. B. WILCOCK (Lab. Derby N.), winding up the debate for the Opposition, said that if the Minister intended to help the independent operator, then he must allocate routes which would be profitable. But if he did that he was deliberately retarding the development of public Corporations. Conversely, if he offered only unprofitable routes to the independent operators he hastened their ruin. Up-to-date aircraft were beyond the resources of any but the largest operators. He thought this point might be taken up with the Chancellor of the Exchequer. It might be that special facilities could be arranged to help the small but enthusiastic independent operator.

The corporations alone, he felt, should run the scheduled services, but they should be ruled out altogether from charter work.

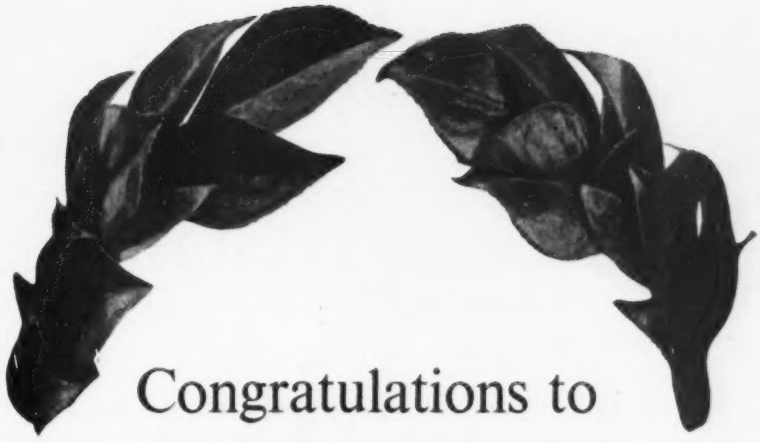
MR. REGINALD MAUDLING, the Parliamentary Secretary to the Ministry of Civil Aviation, replied to the debate. He could not agree with G/C. Wilcock that there was any dilemma over routes. If the routes were unprofitable, they would be ruinous for the operators and the operators would not take them on, because they were not forced to do so. The operators would only take on the routes if they considered that they could be run economically.

Replying to a comment by Mr. Lindgren that the Comet was not a production of private enterprise, the Under-secretary said it was true that Government finance was available to assist in the development of the Ghost engine, which had marked civil and military possibilities, but that development of the Comet itself was de Havillands' own project.

He thought that some of the comments about Scottish aviation had been unworthy of those Members who said them. It had been argued vigorously that the services at present provided by B.E.A. could not be improved upon by any other operator. He did not doubt they were providing a very good service, but there was undoubted evidence, also, of dissatisfaction with the present Scottish services. Both these points of view would be taken into account by the Minister who would make no change in the present set-up until he was convinced that such a change would be in the general public interest. He did not understand the argument that it was right for taxpayers to pay a large subsidy to a nationalised Corporation, but wrong for them to pay a much smaller one to a private corporation for the same thing.

Mr. Maudling paid tribute to the work of the Corporations, but said that they had no "monopoly of ideas." That was the important point. Private operators had shown there was still a vast untapped field of enterprise in civil aviation. It was true, as Mr. Grimston had said, that new types of service generated a new demand. That was the answer to the criticism of the so-called third-class service. It was not just a question of dividing up a limited and definite amount of air transport demand between the existing companies. Here was an immense field for British expansion—for expansion by British brains and enterprise and genius.

The House divided on a motion to reduce the Minister's salary by a token amount of £100. The motion was rejected by 252 votes to 229.



Congratulations to the Supermarine Swift

On Thursday, July 10th, it took Mr. David Morgan just 18 minutes 3.3 seconds to fly from London to Brussels — an average speed of 665.9 miles an hour between the two capitals. Mr. Morgan was piloting one of Britain's latest fighters, the Vickers Supermarine Swift, powered by a Rolls-Royce Avon jet engine. The fuel was supplied by

SHELL AND BP

AVIATION SERVICE

Makers of uniforms

for Officers of the

Royal Air Force

AUSTIN REED

of Regent Street

LONDON AND PRINCIPAL CITIES

755

Important to the Aircraft Industry

weyroc

an efficient, man-made alternative to scarcer conventional timber —

Has the STRENGTH and DURABILITY required for temporary flooring for aircraft under construction;

Is supplied in CONVENIENT LARGE BOARDS that can be worked by STANDARD CARPENTRY METHODS and are ideal for temporary and permanent screens and partitions;

Has the LOAD BEARING PROPERTIES called for by shelving and parts store bins.

A stock of this versatile material can be stored stocked flat in a small space.

weyroc REGD.

MAN-MADE TIMBER

is supplied in boards 8' x 4' x ¼" and ½" in three grades: Plain, Paper-surfaced and Veneered. Full specification on request.

WEYROC is manufactured by a company whose reputation already stands high in the aircraft industry —

The Airscrew Company & Jicwood Limited, Weybridge, Surrey

(Left) Sir Walter Monckton with the Lord Mayor of Derby and Mr. C. Birch, Derby works manager. (Right) Lord Hives, Rolls-Royce chairman, hands the key of the building to Sir Walter; behind are Mr. A. G. Elliott, joint managing director, and the Lord Mayor.

BUILDING for the FUTURE

Official Opening of the Rolls-Royce Apprentice Training School

THE increasing responsibility which firms are nowadays prepared to accept for the training of apprentices—and draughtsmen and graduate engineers also—is extremely encouraging, and should prove an effective long-term insurance against future shortage of skilled manpower. Already this year several more concerns have announced details of apprenticeship schemes, but we may predict that nowhere will the aspiring engineer receive sounder basic instruction than in the Rolls-Royce Apprentice Training School at Derby, opened by Sir Walter Monckton, the Minister of Labour, last Friday, July 18th.

Apprentices have, of course, been trained at Rolls-Royce for nearly fifty years; in fact, there are many present employees of the company who originally learnt their trade under the ægis of the great Sir Henry Royce himself. But the company has expanded to a vast extent since 1906 and provision for training apprentices has necessarily grown in like manner.

A major step forward was taken in 1936, when all aspects of engineering training were placed under the control of a special department. Three grades of apprentice were established: the trade apprentice, arriving from school at the age of 14 or 15; the engineering apprentice, some two years older; and the engineering pupil, of graduate or equivalent standard. These three grades were correlated, and the way was thus opened for the humblest trade apprentice to reach the highest technical positions in the company.

But the transition period between school and factory was traditionally rather haphazard; the time-honoured practice of using the "new boy" as a messenger until he was familiar with his place of work was considered to be rather a waste of valuable time, especially when, in the post-war years, the raised school-leaving age began to influence the maturity of the annual intake.

So it was that plans were formulated for the establishment of a comprehensive training school to ease the schoolboy into industry and transform him, gradually, into a Rolls-Royce craftsman—which implies, perhaps, the pinnacle of engineering ability. And the company has made good use of the present school building, which is fully equipped for its great task. That this is so reflects great credit on the R-R. apprentice-training committee, all young engineers who have risen to responsible positions aided, in most cases, by their own apprenticeship with the company.

The school has actually been in use for some ten months, during which time the apprentices taught there have produced equipment to the value of some £10,000 for use within the Derby factory. Nothing the student does is a mere exercise, although he will normally pass into the works only after a full "academic year" at the school. To some extent, therefore, the institution is doing work previously undertaken by the Derby Technical College.

But this present school is itself only a "pilot" establishment, for it is the ultimate aim to house all branches of training—including the schools for draughtsmen and aero-engine servicing—under one roof and, further, to develop a vocational training and adult-education scheme for the use of the entire Rolls-Royce organization. When restrictions on building and shortages of equipment are less marked than they are at present we will hope for developments at Derby which will set a standard of engineering training at which the rest of the industry can aim.

THE MINISTER OF SUPPLY KEEPS IN TOUCH

Mr. Duncan Sandys, Minister of Supply, had a busy two days in the West Country last Friday and Saturday, when he visited the Bristol, Westland, Rotol and Gloster factories. Flown from Filton to Yeovil in a Bristol 171, he went on to Staverton in a Westland S-55 after seeing the type in production at the Westland factory. (Left) Mr. Sandys is strapped into a Meteor 7 at Moreton Valence by Gloster test pilot Jim Cooksey; Bill Waterton is the pilot. (Right) By the Type 173 prototype at Bristol (l. to r.): Mr. H. J. Larrard, M.a.S. Regional Controller; Mr. Raoul Hafner, chief helicopter designer; Mr. Sandys; Mr. A. E. Russell (director and chief designer); Mr. W. R. Verdon Smith, joint managing director; Mr. C. F. Uwins, aircraft divisional managing director; Mr. Brian Davidson, commercial manager; and Mr. R. S. Brown, aircraft division general manager.

SERVICE AVIATION

Royal Air Force and Naval Aviation News

Birthday Party at C.F.S.

A C.F.S. reunion is an occasion on which to enjoy reminiscence to its full—and the 40th anniversary reunion held at Little Rissington on Friday last was no exception.

The guest of honour was Marshal of the Royal Air Force, Lord Trenchard—"Boom" to his contemporaries. In the chair was A.Cdre A. D. Selway, the present Commandant of the School. On his left was the C.A.S., Marshal of the Royal Air Force Sir John Slessor, who had as a companion Air Chief Marshal Sir Arthur M. Longmore. It was, in fact, a brilliant top table; no fewer than four previous commandants were present and A. Cdre. E. L. Gerrard—who, as a major with Lt. A. M. Longmore, was one of the original four instructors in 1912—was also there.

Air Marshal Sir Hugh Walmsley, who has but another seven days to serve before leaving the Royal Air Force, to take over Air Service Training Ltd., was one of the very few non-C.F.S. people present, but he is, of course, A.O.C.-in-C. Flying Training Command.

Two generations of the Pendred family were represented: A.V-M. L. F. Pendred, who was at C.F.S. from 1925 to 1929, was at the top table, and his son, S/L. G. L. Pendred—born at C.F.S. while it was at Wittering—was in the body of the hall. S/L. Pendred was instructing at C.F.S. from 1949 to 1951 and is now P.A. to the Secretary of State for Air. He is discretion itself in the matter, but it is rumoured that he is occasionally to be seen giving dual instruction to Lord De L'Isle and Dudley at Hendon—mainly on an Oxford.

After welcoming Lord Trenchard, A.Cdre Selway told the assembly how he had tried to hold the reunion at Upavon—the original C.F.S. station—but this was found to be impossible, mainly because of lack of space. In his review of the year's work he stated that 795 pilots had started the course; of these 16 came from the Royal Navy, 12 from Pakistan and two from India; three were sent from Israel and four from Burma. The Royal Navy and Israel, he observed, had the habit of winning trophies. He referred also to F/L. Severne's unsuccessful effort to emulate A.V-M. R. L. R. Atcherley by winning the King's Cup Race. In lighter vein he referred to a note he had received from the C.A.S.—prompted by the Air Council—urging economy in stationery. As proof of the School's interest in economy he produced a legal document, started in 1914, showing "soldier" absentees of C.F.S. Since only 44 names have appeared to date, A.Cdre Selway assessed the book's life at roughly another 120 years.

The president of the C.F.S. Association, Air Chief Marshal Sir James Robb, then spoke. He read messages from Christopher Clarkson—who presented, in 1929, the trophy which is still awarded at each course to the best aerobatic pilot—and from G/C. Randall, the school's first engineer officer.

Looking round the mess he referred to Frank Long and D'Arcy Grieg—both of Schnieder Trophy fame, and to Sir Vernon Brown, who was a test pilot at the School in 1915. There was a word, also, for G/C. Morice, now of Dunlops, and for Major R. E. Nicoll of Handley Pages, who attended the school in 1914. Major Nicoll was able proudly to show a certificate of his ability to fly, *and of his sobriety*, signed by Godfrey Paine, the first commandant. Before sitting down Sir James unveiled a portrait of Lord Trenchard which had been painted by John Leigh Pemberton from the original by Sir Oswald Birley.

Terrific cheering greeted Lord Trenchard when he rose. Speaking with the strong voice which has earned him the name of "Boom", he apologized for being an untidy talker. He was lucky, he said, in being old, because that was the only reason why he was chosen as assistant commandant in 1912. For the early examinations he "set the papers, then passed them himself and had kept the same high standard ever since."

Becoming grave, he spoke of the period after the first world war when, as he said, many tried to break up the Royal Air Force. In this connection he was even offered the post of Assistant Chief of General Staff, but he was, he said, proud of the roundels on a sky background—a flag for which many had given their lives and which he thought should continue in commemoration thereof.

With a touch of humour he recounted how the word marshal came to be used in the R.A.F. and concluded by reminding his audience that, while events and aircraft had completely outrun the imagination of the pioneers of 1912, they were pioneers still. As he sat down the whole assembly rose to acclaim him; he was visibly moved.

Sir John Slessor was in both a humble and grave mood. He had, he said, no right to be on his feet with others present who had more right to talk. (Since he has served in the R.A.F. for 37 years of the 40 of C.F.S., this was a masterly piece of understatement.) Referring to our present-day problems he pointed out that the country had got to adapt itself to a new idea. "We must move out of the old idea of armies and navies," he said, "we have passed into a completely new era." A few stories of the old days of aircraft with warping wings from Sir Arthur Longmore ended a memorable dinner—which had then lasted over four hours. The company adjourned to the ante-room, there to recount yet again what happened in 19??

TROPHY WINNER: Air Marshal Sir Hugh Pughe Lloyd, A.O.C-in-C. Bomber Command, with S/L. W. R. Sloane, who commands No. 90 Squadron, which won the Laurence Minot Trophy. On the right is A. V-M. Harvey who is S.A.S.O. at Bomber Command and was the pilot when the trophy was won by No. 7 Squadron in 1928. The bomb-aimer on that occasion was S/L., now Marshal of the R.A.F., Lord Portal.

Laurence Minot Trophy

HIS squadron, No. 90. having won the Laurence Minot Trophy, S/L. W. R. Sloane was summoned on Thursday of last week to attend Bomber Command headquarters to receive the personal congratulations of the A.O.C-in-C., Air Chief Marshal Sir Hugh Pughe Lloyd.

Sir Hugh, who coined the phrase "The bomber is a rapier, not a bludgeon," arrived carrying a silver-gilt rapier which, he said, had been made to present to the Americans had they come first. (The conditions of the Laurence Minot Trophy preclude its presentation to foreign air forces). As it turned out, the Americans came second, 332 points behind No. 90 Squadron. Even so, it is expected that the rapier will be presented to them for their excellent performance.

Tieing for third place, with 2,095 points each, were No. 97 Squadron (S/L. T. Helfer, D.F.C.) and No. 115 Squadron (S/L. G. E. R. Alford, A.F.C.).

No. 90 Squadron was the third Lincoln squadron to convert to Washingtons and is using the Norden bomb-sight. No. 115 also has Washingtons but No. 97 is still flying Lincolns equipped with the standard Mk 14 bomb-sight. The Americans used B-50s. For the first time Canberras (No. 617 Squadron) entered the competition.

Originally drawn up for day bombing, the rules have now been altered to make the Laurence Minot Trophy a visual night-bombing contest. The competing units have to provide a different crew each night for four successive nights. After a cross-country flight of some four hours each aircraft is required to be over the target within six minutes of zero time, and only one run over each target is allowed. Judges carried in the bombers ensure no infringement of these rules, and failure to arrive within the six minutes brings disqualification. Actually only eight aircraft were put out of the competition for this reason. The Washingtons bombed from 25,000ft and the Lincolns from 20,000ft. All the R.A.F. aircraft used the standard 25 lb practice bomb but the Americans used their own 100 lb. bomb.

Fontainebleau H.Q. Opened

ON Saturday last General Lauris Norstad performed the ceremonial opening of new headquarters of Allied Air Forces, Central Europe at Fontainebleau. Marshal of the Royal Air Force Sir John Slessor was invited to represent the R.A.F., and Air Marshal W. A. Curtis on behalf of the R.C.A.F. Representing 2nd T.A.F. was Air Marshal Sir Robert M. Foster.

Started in the few rooms of Des Princes wing of the Fontainebleau Palace originally occupied on April 2nd, 1951, the headquarters now contain 494,960 sq ft of floor space. Of the 3,733,000,000 French francs appropriated for the new building, 3,474,000,000 have been spent.

Half-yearly Promotions

BELOW is the concluding list of half-yearly promotions announced by the Air Ministry. The remainder of the names appeared in *Flight*, July 11th and July 18th.

Flight Lieutenant to Squadron Leader.—W. E. Martin, D.F.C., A.F.C.; G. W. O'Donovan, D.S.O., D.F.C.; G. J. South, D.S.O., D.F.C.; K. H. Bayley, D.F.C.; D. G. Bladon; L. G. Martin; W. S. O. Randle, M.B.E., A.F.C., D.F.M.; P. J. Anson, D.F.C.; A. D. Hindmarsh, A.F.C.; S. Slater, D.S.O., D.F.C.; K. L. Hughes, D.F.C.; F. S. Hazlewood, A.F.C.; J. E. W. Legras; A. Watson; R. B. Bryan; G. W. Spiers, M.B.E.; E. A. Tilt; G. C. Stickland; H. F. Jacob; W. G. H. H. Guiseley; H. Whiteley; R. J. Sills, O.B.E.; R. F. Jones; R. G. Chapman; E. Heathcote; R. J. Bartlett; F. A. E. Cramp; B. Brown; A. B. Avery; D. E. Hilliard; K. J. B. Dunlop, O.B.E.; R. G. C. Castell; A. Mackelden; A. R. Boardman; J. M. S. Adams, M.A., A.M.I.E.E.; G. M. McMinn, M.A.; P. M. Chettle; B. Brooke; J. T. C. Byrne; H. Bentley, M.B.E.; A. L. Fussell, B.Sc., A.F.R.Ae.S.; A. Boonham; R. F. J. Barber; E. R. Hester; S. C. Dawson; G. D. P. Quinn, D.F.M.; R. Munns, D.F.C.; T. C. Imrie, D.F.M.; N. W. Maskell; R. I. Gray, A.M.I.E.E.; H. Ball; P. C. Barnes; G. Wynn; J. H. Spencer; A. R. S. Bridger; F. A. Houghton, M.B.E.; W. E. Collingwood, D.F.M.; F. Barrell; L. E. Francis; J. A. Theophilus; D. C. Goodrich; D. H. Beckett; G. D. Cooper, M.B.E.; G. N. Rushen; T. McGreevy; R. Howard; E. Merch-Chammon; R. P. A. J. de Burlet; J. S. Mason, A.F.R.Ae.S.; R. E. Powell; A. V. Breese; L. L. Flowerdew; G. E. de la Haye; J. W. Henley; A. C. Straker; A. C. Marfleet; W. Beeton; A. M. M. Hill, D.F.C., D.F.M.; W. H. S. Young; D. R. Lewis; G. L. Armstrong; R. G. T. Williams; D. Rogers, D.F.C.; J. E. Smalley; A. R. Howell; W. L. Colle; A. Lawson; W. G. Lydan; C. F. Fairfoot; J. T. Leslie; A. H. Sloan; W. R. Mackie; T. W. Dodd; R. B. Harrison; E. N. Lewis, A.F.C., A.F.M.; R. M. Martin; S. Johnson; B. R. R. Snape; N. C. Tuxworth; J. D. Watson; P. G. Maude-Roxby; F. Barrett; R. C. Parks; A. Scott, A.F.C.; C. B. Elford; J. M. Hillier; N. S. Fear; D. Q. Watson, D.F.C.; F. W. Brown, D.F.C.; A. S. Holgate; J. G. Sharratt; L. E. S. Whaley, D.F.C.; R. Bullen, G.M.; K. Dear, D.F.C.; R. B. C. Wright; W. P. Hogarth; A. I. Mitchell, M.C.; J. L. Mill; C. H. J. Parsons; H. G. Yearwood; F. J. Coulson; D. C. Charlier, M.C.; E. L. McMullen; G. A. Clarke, A.F.C.; H. B. Harries, A.F.C.; H. Jacobs, D.F.C., A.F.C.; H. P. Hopkins, M.B.E., A.F.C.; N. Morse; C. W. Hobgen; A. G. Bullen, M.B.E.; S. W. K. Hart; L. J. Morris.

Flight Officer to Squadron Officer, W.R.A.F.—J. Mullen; S. M. Ravenhill; N. E. Stockings; R. L. Dodds; C. E. Warren; S. P. Titcombe; E. Gwilt, M.B.E.

A.T.C. Win Again

FOR the fifth time, the Air Training Corps has won the annual Inter-Services small-bore shooting competition which took place last month for the *Punch* trophy.

Units participating were :—for the Air Training Corps, No. 470 (Falkirk) Squadron; for the Sea Cadet Corps, 277 Preston Training Ship, Galloway Unit; and for the Army Cadet Corps, 7th Gloucester Regiment, Royal Artillery.

The Air Training Corps obtained 974 points—a record number. Runners-up were the Sea Cadet Force, who were 59 points behind.

The competition was even until the third detail, when Sgt. Bishop, A.T.C., and Cadet Binnie, A.T.C., both secured "possibles." The next pair of A.T.C. boys put the issue beyond doubt by both scoring 99.

A.V-M. W. E. Staton, C.B., D.S.O., M.C., D.F.C., presented the prizes and he stressed the need for every boy to learn to use a rifle efficiently.

No. 470 (Falkirk) Squadron A.T.C. is commanded by F/L. E. Stoddart, R.A.F.V.R. (T) and the coach is F/L. Robertson.

Air Force List

THE 1952 unrestricted edition of the Air Force List is now on sale at H.M. Stationery Office. In addition to giving the heads of the main branches at the Air Ministry and Command Headquarters, and the gradation lists for active officers of the R.A.F., the R.Aux.A.F. and the R.A.F.V.R., the List records the names of retired officers and the prizewinners in a number of R.A.F. competitions. It also lists British Air Attachés abroad, United Kingdom Headquarters of Commonwealth air forces and the British element of H.Q., Allied Air Forces Central Europe. The List costs 17s. 6d.

ONE-MAN HANDLING

WORKING on the same principles as the ordinary pedestrian-controlled electric vehicle, the new Lansing Bagnall aircraft handler permits single-handed movement of aircraft on carrier flight decks and airfields. It is claimed that it reproduces the effort of 20 men. The maximum towing speed is 4½ m.p.h. and the speed is governed by a twist grip control.

Much thought has been given to designing the handler to allow the aircraft to be approached from any angle and, since either the nose or tail wheel is lifted and held in a rotating pallet, the aircraft can be moved in any direction, even if the wheel being towed is locked in a fore and aft position.

The method of operation is to fit the pallet, or adaptor ring, to the tailwheel or nosewheel of the aircraft, drive the lifting end of the handler into position and operate the hydraulic control to lift the wheel from the ground. When this has been completed the aircraft can then be towed or pushed in any direction with precision.

Earlier this year the prototype was given four months' testing in H.M.S. *Theseus*. On arrival back at the Lansing Bagnall works it was reported to be mechanically and electrically sound.

Demonstrating and inspecting the aircraft handler are: Mr. A. R. Wright, works manager; Air Marshal Sir Thomas A. Warne-Brown, A.O.C.-in-C. Maintenance Command; Mr. J. Sharp, managing director; A. V-M. E. C. Farman, S.A.S.O., Maintenance Command; A. V-M. R. G. Hart, Director-General of Engineering; Mr. R. Gluyas and S/L. Little. (Left) Mr. Wright demonstrates the handler's ability to cope with a Firefly 5 with folded wings (this imposes an extra load).

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Airworthy Hurricanes

YOUR correspondent "N.N.", in your issue for June 27th, raised the question: "How many British Hurricanes are flying in this country today?" I should say two, these being:—

(1) What is claimed to be, and I feel must indeed be, the last aircraft of this type flying with the R.A.F.—LF363, which I saw recently at an airfield near York. This travel-stained machine is light blue overall, with red spinner and standard R.A.F. markings, as that which "N.N." describes; beneath its cockpit it bears the crest of H.Q., No. 11 Fighter Group, and a senior officer's flag.

(2) The sole Hurricane on the Civil Register—G-AMAU, Hawker's well-known *Last of the Many*, being the last production aircraft, formerly PZ 865.

In addition, the Air Ministry have retained at least two Hurricanes purely for static exhibition purposes—L 1592 and P 2617, displayed in 1950 and 1951 respectively on Horse Guards Parade during Battle of Britain Week.

Richmond, Yorks. T. T. THEWLIS.

Playing Fair with the Public

PUBLIC attendances at air displays in the last year or two, as recorded in *Flight's* reports, leave no doubt about the way in which well-advertised events of this kind attract the crowds. Visits to several displays this summer, however, has made me wonder whether organizers, having taken the gate-money (whether in aid of charity or of any other cause) remain aware of the moral—if not legal—responsibility which they then bear towards their visitors.

I am thinking, especially, of events disorganized by rain. One display, in particular, was badly interfered with from the start, and a very "scratch" programme had, perforce, to be given—the sort of thing that has to be "made up as you go along," with, inevitably, long and dismal waits between the various items. Nothing daunted, a painfully facetious commentator kept up a running fire of optimistic forecasts about the clearance which the met. people were promising would appear at any moment, and about the breath-taking aviation that would take place the moment the front passed over.

Needless to say, the British summer being what it is, nothing of the sort occurred, but the patient thousands continued to huddle under what shelter was available.

Would it not be more honest to "scrub" a programme altogether in such circumstances, and offer the people their money back? Alternatively, they might be told that there was still some hope of putting on a programme of a sort, and that they could either take their chance and remain, or leave (and get their money back) within, say, 20 minutes?

Please do not think that, though one of them, I always take a good view of the habits of air-display spectators themselves. At one event I saw a normally attractive and well-kept airport building reduced to the level of a four-ale bar, with the refreshment-hall floor a revolting lake of beer, tea and litter. Possibly the organizers I have criticized feel that they are getting their own back for the past misdeeds of their public

Oxford. RUBBERNECK.

Helicopter Termini

IN your issue of July 11th, Mr. Barrie Aldbury queries suitable helicopter sites. There are acres of railway lines wasting space whose site value must almost equal the National Debt.

Victoria station would be the most easily converted, as the problem of smoke extraction hardly exists. Passengers' luggage and taxi requirements would also be simply provided for by existing facilities.

Possibly a percentage of the landing fees could be reserved for building a tube extension from Victoria to London Airport and so speed up air travel.

New York has a built-over railway, so it can be done.

London, W.2. GAVIN WOOLMER, CAPT., T.D.

NEW TRACTORS FOR B.O.A.C.

ILLUSTRATED here is the prototype of a new aircraft-tractor which B.O.A.C. have been testing at London Airport during the past six months with a view to its adoption for heavy-duty work. Built by the Mercury Truck and Tractor Co., Ltd., of Gloucester, to the Corporation's specification, it is reported to have been so satisfactory in operation that a further twelve have been ordered; the first is due for delivery early next year.

The prototype tractor at London Airport, with a Stratocruiser in tow.

The "Airtug," as the tractor is known, has a maximum draw-bar pull of 10,000 lb, derived from a Perkins six-cylinder diesel engine developing 70 b.h.p. at 2,000 r.p.m. Overall dimensions are 12ft 10in long, 7ft 1in wide and 5ft 6in high, the weight is 14,000 lb, and there is a turning radius of 14ft 6in with a 6ft 8in wheelbase.

A valuable feature is the use of a Daimler fluid flywheel and four-speed Wilson pre-selector gearbox, which ensures that the tractor will move an aircraft from rest without snatch. It also enables the driver to change into top gear under full load, thus, it is stated, reducing the towing time from hangar to tarmac by more than half.

On test, the "Airtug" has pulled a Stratocruiser, which weighs 107,000 lb, up a ramp with a 1 in 12 gradient.

B.O.A.C. have, experimentally, fitted their own V.H.F. radio equipment for communication with airport control and the results are said to have been excellent.

A vertical standard has been fitted to the tractor so that the powerful swivel-lamp for illuminating the aircraft wing-tips is within easy reach of the driver. In front, beneath the central fog lamp and between the side lamps, there is a built-in "Aircraft on Tow" sign which is illuminated at night.

CABIN-SUPERCHARGER RELIABILITY

AN overhaul life of 2,400 hr for Godfrey type 15 Mk 9 cabin-superchargers, installed in B.O.A.C.'s Argonaut fleet, has been approved by the Air Registration Board; this represents an increase of 50 per cent over the original period of 1,600 hr.

The Type 15 Mk 9 was chosen by Trans-Canada Airlines when they were converting the air-conditioning systems of their Canadair North Star airliners in 1948 and 1949. The change was reported to have resulted in a considerable saving in maintenance costs and a lower installational weight and, in January 1951, B.O.A.C. decided similarly to convert the air-conditioning systems of their Argonaut fleet.

ACCURATE TORQUE

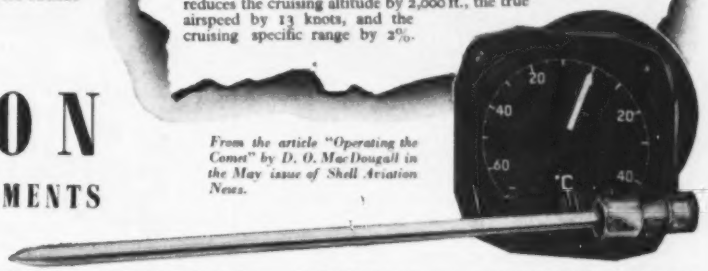
UNSKILLED labour can, it is claimed, obtain precision results with the "Acratork" Mk 6 range of torque spanners. Of entirely new design—described in a recent leaflet from the manufacturers—these spanners are fully automatic when once set. Exceeding the pre-set load releases a cam and frees the spanner; the spanner is not "solid" in reverse. The present range runs from a small spanner of 0-3 lb ft to a 36in model for 20-250 lb ft; a hydraulic pattern is under development for loads of over 500 lb ft. The spanners, and a series of test and setting rigs, are distributed by Cory Bros. and Co., Ltd., Cory's Buildings, Cardiff.

ACCURATE INDICATION OF AIR TEMPERATURE GOVERNS THE WHOLE ECONOMY OF OPERATION

Weston Thermometry has been chosen for several applications on the De Havilland 'Comet' including fuel temperature, cabin air temperature, wing and tail de-icing as well as outside air temperature.
Illustrated is the Model S.110G/9 Thermometer Bulb with its associated Indicator, the Model S.63 circular scale Ratiometer used for outside air temperatures.

Flight Planning The air temperature is one of the most important factors in the operation of a long-range jet aircraft as it influences the rate of climb, the heights at which the aircraft will cruise, and hence the true airspeed. The latter in turn determines the specific range (air miles per pound of fuel) since within limits, fuel consumption per hour at the normal cruising altitudes does not vary much. It can be seen therefore that air temperature controls the choice of flight path, largely determines the fuel load carried, and governs the whole economy of the operation. The effect of air temperature on Comet operations can be illustrated by the fact that a 10°C. rise in temperature reduces the cruising altitude by 2,000 ft., the true airspeed by 13 knots, and the cruising specific range by 2%.

From the article "Operating the Comet" by D. O. MacDougall in the May issue of Shell Aviation News.



WESTON
AIRCRAFT INSTRUMENTS

SANGAMO WESTON LIMITED ENFIELD MIDDLESEX
Tel: Enfield 3434 (6 lines) 1242 (4 lines) *Grams: Sanwest, Enfield.*
London Office: St. Georges Court, 22-26 New Oxford Street, London, W.C.1. CHA 4971. Scottish Factory: Port Glasgow, Renfrewshire.
Branches: Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton, Brighton

Teddington CONTROLS

- ★ WING AND ENGINE ANTICING SYSTEMS
- ★ STARTER TIME AND SEQUENCE SWITCHES
- ★ CABIN CONDITIONING SYSTEMS
- ★ MASS FLOW CONTROLS
- ★ WIND-SCREEN ANTICING CONTROLS
- ★ FUEL TANK PRESSURISATION
- ★ HOT AIR VALVES
- ★ FUEL VALVES
- ★ PRESSURE SWITCHES AND CONTROLS
- ★ THERMOSTATIC CONTROLS
- ★ HUMIDITY CONTROLS
- ★ ELECTRO-MAGNETIC VALVES

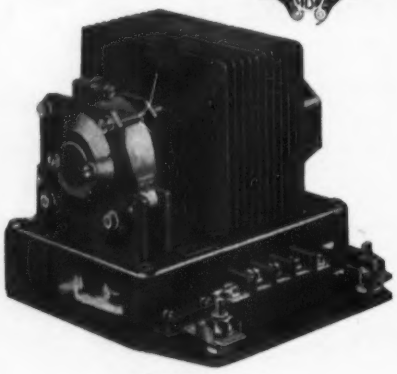
Each of these specialised requirements for modern aircraft opens up a spate of problems . . . each represents a field in which Teddington have acquired unique knowledge and experience.

Teddington

Teddington AUTOMATIC CONTROLS

TEDDINGTON CONTROLS LTD., CEFN COED, MERTHYR TYDFIL, SOUTH WALES. Merthyr Tydfil 666

NEWTON-DERBY



AUTOMATIC
VOLTAGE REGULATORS

Also Makers of Rotary Transformers and Anode Converters. Wind and Engine Driven Aircraft Generators. High Frequency Alternators and High Tension D.C. Generators

ELECTRICAL PLANT SPECIALISTS

NEWTON BROTHERS (DERBY) LIMITED

PLAZA PICCADILLY CIRCUS NOW

LONDON FILMS present
RALPH RICHARDSON · ANN TODD
NIGEL PATRICK · JOHN JUSTIN
The SOUND BARRIER U
WITH DINAH SHERIDAN
A DAVID LEAN PRODUCTION
Story & Screenplay by TERENCE RATTIGAN
Produced & Directed by DAVID LEAN
DISTRIBUTED BY BRITISH LION

THE OLD ESTABLISHED
AIRCRAFT FURNISHING SPECIALISTS

RUMBOLD

L. A. RUMBOLD & Co. LTD.
KILBURN, LONDON, N.W.6

Jubilee

EITHER IT IS
— or it isn't!

JUBILEE has been our registered trade name for 30 years, and may not be used to describe any other clip.

THE FINEST CLIP in the world

L. ROBINSON & CO., (GILLINGHAM) LTD., London Chambers GILLINGHAM KENT PHONE 5282

L32625

But for recording the speed of aircraft

Vinten

INSTRUMENTATION CAMERAS

W. VINTEN LIMITED, NORTH CIRCULAR ROAD, CRICKLEWOOD, N.W.2. *Telephone: GLAdstone 6373*

Suppliers of machined and fabricated components in Tufnol, Bakelite and similar materials to Britain's aircraft industry

Telephone: CLERKENWELL 2333-4 & 7247

UHLHORN BROS. LIMITED ESTD. 1887

Telegrams: UHLHORN, AVE, LONDON

We are proud to have the pleasure of supplying our precision products to many of the leading British aircraft constructors

UHLHORN BROS. LTD.
53 CITY ROAD, LONDON, E.C.1

STEEL BUILDINGS for DISPOSAL

Structure. 100′ × 48′ × 14′ high.
Asbestos roof and sides. 6′ glazing in roof slopes.

Storage Building. 180′ × 90′ in three 30′ bays × 14′ high.
New cladding and ¼″ P.G. in roof slopes.

Crane Building. 226′ × 55′ span × 27′ high.
With 5 ton O.E.T. crane 400/440V. Steel sliding doors, gutters, etc.

Single Story Building. 192′ × 42′6″ × 14′ high. Ready for erection.

These buildings can be supplied and erected complete

CHAMBERLAIN INDUSTRIES LTD.
STAFFA ROAD, LEYTON E.10
Telephone: LEYtonstone 3678

TECHNICAL ASSISTANTS

required for important work on modern aircraft applications and Guided Weapon Work.

A. Young Man with Engineering or Science Degree for wide range of duties in Design Drawing Office.

B. Aerodynamicist. Good degree essential.

C. Stress Office Assistants. Minimum qualifications—engineering degree.
(1) Analysis of research test results.
(2) Stress calculation—previous experience on aircraft structures.

D. Technical Assistant for Weight Estimating—previous experience or an intermediate Stressman essential.

Reply in confidence, giving full particulars of age, education and experience to:—

Personnel Manager,
DE HAVILLAND PROPELLERS, LTD.
Hatfield, Herts.

Or apply any Labour Exchange.
Please quote reference of position sought.

FLIGHT and AIRCRAFT ENGINEER

PRESS DAY — *Classified advertisement "copy" should reach Head Office by* FIRST POST THURSDAY *for publication in the following week's issue subject to space being available.*

CLASSIFIED ADVERTISEMENTS

Advertisement Rates. 4/- per line, minimum 8/-, average line contains 6-7 words. Special rates for Auctions, Contracts, Patents, Legal and Official Notices, Public Announcements, Tenders 5/- per line, minimum 10/-. Each paragraph is charged separately, name and address must be counted. All advertisements must be strictly prepaid and should be addressed to FLIGHT Classified Advertisement Dept., Dorset House, Stamford Street, London, S.E.1.

Postal Orders and cheques sent in payment for advertisements should be made payable to Iliffe & Sons, Ltd., and crossed & Co.

Trade Advertisers who use these columns regularly are allowed a discount of 5% for 13, 10% for 26 and 15% for 52 consecutive insertion orders. Full particulars will be sent on application.

Box Numbers. For the convenience of private advertisers Box Number facilities are available at an additional charge for 2 words plus 1/- extra to defray the cost of registration and postage, which must be added to the advertisement charge. Replies should be addressed to "Box 0000, c/o Flight," Dorset House, Stamford Street, London, S.E.1.

The Publishers retain the right to refuse or withdraw advertisements at their discretion and do not accept liability for delay in publication or for clerical or printer's errors, although every care is taken to avoid mistakes.

Situations Vacant. The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service etc. if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

AEROSERVICES

Draw Attention to:—

- ★ Their COMPLETE Service available to all Operators throughout the World.
- ★ Their WILLINGNESS to act as Buying Agents for a small percentage on buying price.
- ★ Their INDEPENDENCE and freedom of action enabling Aeroservices to supply Operators at the lowest possible prices.
- ★ Their READINESS to quote for anything whether it is complete Aircraft, Engines, Spare Parts or Ground Equipment.

It *will* pay Operators to contact

AEROSERVICES
S.A.R.L.
36, Boulevard Haussmann, Paris 9e.
Tel.: Provence 9078. Cables: Aeropaul, Paris.

AEROSERVICES
(London) Limited
46, Hertford St., Park Lane, London, W.1
Tel.: GROsvenor 8383. Cables: Aeropaul, London.

WOLVERHAMPTON AVIATION LTD.
THE LEADING LIGHT AIRCRAFT ENGINEERS.
THE AIRPORT WOLVERHAMPTON
tel. FORDHOUSES 2228

AIRCRAFT FOR SALE

FIELD AIRCRAFT SERVICES, LTD., offer COMPREHENSIVE AIRCRAFT SERVICE
Please send your inquiries to:
FIELD AIRCRAFT SERVICES, LTD., CROYDON AIRPORT, SURREY
Phone: Croydon 7777. Cables: FIELDAIR, Croydon. [0258

AEROSERVICES (LONDON) Ltd. CAN offer a variety of aircraft, engines and spare parts. WRITE, telephone or cable your inquiry to :— **46, HERTFORD STREET, PARK LANE, LONDON, W.1.** TELE.: GROsvenor 8383. Cables: AEROPAUL, London. [0040

RAPIDE 8-seater. 12 months C. of A. Low engine hours. 4-channel radio. £2,500, or near offer.—Box 1518. [0456

AUSTER Autocrat C. of A. expires June, 1953. Engine hours 600. £950.—Box 1519. [0456

W. S. SHACKLETON, Ltd., Europe's largest aeroplane dealers, offer at list price for early delivery a brand new AIGLET TRAINER of the latest type, now nearing completion at the maker's works. Extras include full blind flying panel, bench-type rear seat, long-range tanks, aerobatic front seats, metal propeller and silencer. We will take any good, sound aeroplane in part exchange.

£325 TAYLORCRAFT D. Identical with the machine that won the 1952 King's Cup Race. Fitted with the reliable Cirrus Minor engine, year's C. of A., new upholstery and carpets. A really sound example of this excellent little two-seater.

£???? RAPIDES, several now undergoing overhaul, offered with new Certificates of Airworthiness and fully overhauled engines.

£550 UPWARDS—AUSTER AUTOCRATS. We have a big selection of these famous aeroplanes actually in stock. Total hours since new from 150 only. New Certificates of Airworthiness in all cases. Five of these planes can be inspected at an aerodrome near London.

£350/550 TIGER MOTHS with new Certificates of Airworthiness and in some cases newly overhauled engines and colour schemes to suit purchaser.

£425 PROCTOR III just completed full Certificate of Airworthiness overhaul. Engine only 100 hours since complete. Beautifully upholstered in red leather. Demonstrations gladly near London.

£250 FAIRCHILD ARGUS. Warner Super Scarab engines. We have two machines in stock in conditions almost like new but without Airworthiness Certificates. Machines were prepared to C. of A. standard by former owners who could not take delivery. They have been carefully stored under ideal conditions and are offered as a real bargain to anyone who appreciates this sound, rugged, safe, four-seater.

£1075 MESSENGER, new C. of A. Colours to choice. Full blind flying panel, starter and battery and metal propeller. Any demonstration. A really beautiful and very sound and safe aeroplane.

£???? GEMINI. Full C. of A., newly overhauled engines. Colour and equipment to choice. Will accept a reasonable offer.

WE also have a newly overhauled Avro Anson Mk. I and an Airspeed Consul ready for immediate sale.

W. S. SHACKLETON, Ltd., 175, Piccadilly, London, W.1. Tel.: Regent 2448/9. Overseas Cables: Shacklaud, London. [0070

£435 Auster Autocrat C. of A. till May 1953. Perfect condition.—Elliott, 61, Farrer St., Middlesbrough. [0426

COSTS 10p per hour flying my 40 h.p. Piper Cub. Fully approved dual control trainer. Bargain £250.—Box 1550. [0469

G. A. CYGNET, little used since new, fully aerobatic with year's C. of A., £450.—Cheltenham Aero Club, Staverton Airport, Cheltenham. [0456

MILES MAGISTER. Airframe 1,300, engine 470, 20 since C. of A. expires Sept. 1952. Immaculate, highly polished red, perfect condition. Immediate delivery. £950. Privately owned.—Box 1547. [0456

Whilst stocks last take advantage of this exceptional value offer of AIR CREW

ANTI-GLARE SPECTACLES

Safeguard your sight—prevent eye strain. Invaluable to Motorist, Aviator, Angler and for all outdoor pastimes. Brand new. Comfortable to wear. Heavily nickelled frame fitted with optically ground tinted lenses. Note the remarkably low price. Complete with case **21/-** **17/6**

Brand new Khaki Drill Summer **FLYING HELMETS** suitable for Gosport or electrical intercom. **25/-**

GOSPORT TUBES for R.A.F. pattern flying helmets. In stock. Per pair **18/-**

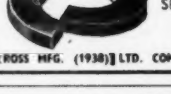
Also large disns. for civilian users at same price.
Terms to Flying Clubs. Trade supplied.
Send 3d. in stamps for illustrated catalogue.

D. LEWIS LTD. (Dept. F)
Leather Clothing Manufacturers for Home or Export
124 GT. PORTLAND ST., LONDON, W.1
Tel.: Museum 4314. Grams: Aviolet, Wesdo, London

DAKOTA SPARES
Undercarriages —all parts available
Wheels complete.
Exhaust Collector Rings complete.
Exhaust Tail Pipes, Brake Drums.
All for immediate delivery ex stock.

Staravia
BLACKBUSHE AIRPORT
CAMBERLEY, SURREY
Tel.: Camberley 1600

AIRCRAFT SPRING WASHERS



TO B.S. SPECIFICATION S.P.47

CROSS MFG. (1938) LTD. COMBE DOWN, BATH

Palmer FOR SAFE LANDINGS

TYRES • WHEELS • BRAKES *Etc.*

AIRCRAFT FOR SALE

R. K. DUNDAS, Ltd.,
OFFER for immediate sale
DAKOTAS
DAKOTAS
DAKOTAS
RKD 116 C47 Freighter. Cargo doors and floor.
RKD 117 C47A Freighter. Cargo doors and floor.
RKD 119 C47 Freighter. Cargo doors and floor.
RKD 120 C47A Freighter. Cargo doors and floor.
RKD 121 C47A Freighter. Cargo doors and floor.
RKD 118 C47A Passenger. 21 seats.
RKD 122 C47A Passenger VIP. 14 seats.
FREE for export.
DELIVERED anywhere immediately.
DETAILS and prices on application.
R. K. DUNDAS, Ltd.,
29, BURY STREET, LONDON, S.W.1.
WHI. 2949. Cables: "Dundasaero, Piccy, London."

CROYDON AIRPORT, CRO. 0408. [0559

VENDAIR, Croydon Airport, have a number of Proctor III aircraft, without C. of A., which must be sold.—Call or write, Vendair, Croydon Airport, Croydon 7744. [0600

MILES GEMINI; airframe and engine hours low; 12 months' C. of A.; 6-channel Plessey; interior grey leather; full equipment. Immediate delivery. Offers, or exchange for Rapide Magister.—Box 6949. [0000

MILES GEMINI; aircraft and engine hours 900 since new; 12 months' C. of A.; interior grey leather; full equipment. Immediate delivery. Offers, or exchange for Magister Rapide.—Box 6950. [0001

MILES MESSENGER full 4-seater. Airframe 430 hours, Gipsy Major 1D 290 hours. C. of A. Dec., 1952. Very reliable and safe. Have flown to Sicily, Italy, Switzerland, Spain, France and Belgium within last six weeks. Owner has now purchased twin. Accept £950 or car.—Turner, Palmers Green 7305. [0930

AIRCRAFT WANTED

MILES MAGISTER with long term C. of A. and engine hours.—Box 6952. [0933

LIGHT aircraft. Detailed information including price, engine and airframe hours, etc.—"Poplars," Hornsea Grove, Redcar, Yorks. Phone 589. [0475

RAPIDE with long term C. of A. and engine hours, multi-channel V.H.F.; S.B.A. and or radio compass.—Box 6962. [0602

AIRCRAFT ACCESSORIES AND ENGINES

R. A. SHORT AVIATION.

PRATT & Whitney 1830-92 engines, complete with carburettors—nil hours since overhaul. Several available for immediate delivery.

ALSO quantity of low and nil hour Gipsy Major 1's and Queen II's, with an abundant stock of spares for same.

CHEETAH X engines and XV power plants. Lycoming O-290-3's, Hercules 630. All with low hours and at competitive prices.

WE are still the Miles Magister specialists and can supply anything from complete aircraft to a split pin for this machine.

R. A. SHORT AVIATION, 139, Godstone Road, Whyteleafe, Surrey. Tel.: Uplands 0091. [0472

AIRCRAFT ACCESSORIES WANTED

MAGNETO endurance test rig, capable of testing magnetos up to 14 cylinder. Also magnetiser for magnetising rotating magnet and inductor type magnetos.—Box 1551. [0471

AIRCRAFT SERVICING

CRACK detection by Magna Flux. A.R.B. Certificate of Compliance coverage for aircraft parts. Prompt service; reasonable charges.

C. & S. AIRCRAFT, Blackbushe Airport, Camberley 1600 (Extn. 307). [0310

BROOKLANDS AVIATION, LTD., Brooklands Aerodrome, Weybridge. C. of A. overhauls, modifications and conversions. Tel.: Byfleet 436. [0305

REPAIRS and C. of A. overhaul for all types of aircraft.—Brooklands Aviation, Ltd., Civil Repair Service, Sywell Aerodrome, Northampton. Tel.: Moulton 3218. [0307

CAPACITY AVAILABLE

CAPACITY for producing forging dies and copy milling capacity for turbine blades.—Apply, Armytage Bros. (Knottingley), Ltd., The Foundry, Knottingley, Yorks. Tel. 46. [0434

CARAVANS

A CARAVAN PERFORMANCE.

U.K.'s LARGEST (ex-editor caravan paper living in van 13 years) caravan distributor, has been selling caravans for ten years. You must surely know already that he has U.K.'s biggest selection and the only unconditional year's guarantee with free-van-lent-for-leaky-one, and all-repairs-free one year. You know also, perhaps, that he is the secretary of the only Caravan Residents Association, which also hopes to get justice for caravan dwellers. And he has better H.P. acceptances because—well, the H.P. companies sometimes ask the bank where A.S.J. keeps his account—now he's getting on. Also free rail fares to those far away if van bought. But also he couldn't have achieved this unique position without a *complete* honesty and even affection for his customers (see the two pages of new testimonials in the July "Caravan"). A caravan performance! He performs and does what he promises! So why not write for 1 lb. of free brochures and advice articles to Dept. F, Taplow please?—A. S. Jenkinson, Ltd. (our equal selection, London branch: 80, Oxford Street, London, W.1 (corner of Rathbone Place). Telephone: LANgham 9936-7. Two minutes' from Tottenham Court Road tube station. Open till 8 p.m., seven days a week. Bath Road, Taplow, Bucks., Telephone: Maidenhead 3434-5-6. Always open. Easy to reach—right on Main A4, outskirts Maidenhead. Taplow station 4 mins. Now open: Hammersmith branch (corner of Sussex Place and Hammersmith Bridge Road, W.6). One minute Hammersmith Broadway. Open till 8 p.m. every day. [0599

TO REMIND YOU

that we also sell

light aircraft

For instance, we have

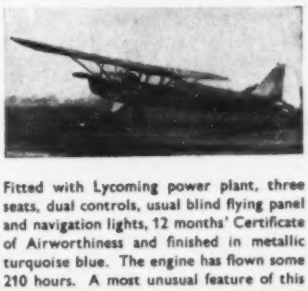
in stock

MILES GEMINI

An excellent machine, upholstered in grey leather, 12 months' Certificate of Airworthiness, nil hours since overhaul, Cirrus Minor II engine, STR. 9, V.H.F. blind flying panel and navigation lights.

also an

AUSTER Mk. V



Fitted with Lycoming power plant, three seats, dual controls, usual blind flying panel and navigation lights, 12 months' Certificate of Airworthiness and finished in metallic turquoise blue. The engine has flown some 210 hours. A most unusual feature of this aircraft is that the machine is fitted with exhaust venturi silencer of American origin. This makes a remarkable reduction in engine noise whilst its effect on the performance is negligible.

AEROCONTACTS
Limited
GATWICK AIRPORT, HORLEY, SURREY
TELEPHONE HORLEY 1510 CABLES AEROCON HORLEY

CARAVANS

NEW "Statesman," £1,065. Other Berkeleys from £300-10-, New Glider 4-berth de luxe, £398-10-, and 2-berth, £313. Safari, £365. Towing. Hire purchase.—Mantles Garages, Ltd., Biggleswade. Tel. 2113. [0367

CLOTHING

R.A.F. and R.N. officers' uniforms purchased; large selection of R.A.F. officers' kit for sale, new and reconditioned.—Fisher's Service Outfitters, 65-68, Wellington St., Woolwich. Tel. Woolwich 1695. [0567

CLUBS

REDHILL FLYING CLUB.

LEARN to fly at Redhill Aerodrome, Surrey. South London's nearest flying centre. 25 miles from Hyde Park Corner. £5-10- per hour dual; from £2-10- solo; instrument flying, instructors' and advanced courses. Attractive clubhouse with full catering facilities.—Tel.: Nutfield Ridge 2345. [0947

LEARN to fly at Elstree Flying Club. M.C.A. approved 30-hour courses. Three guineas per hour.—Tel.: Elstree 3370. [8314

HERTS and ESSEX AERO CLUB, Broxbourne Aerodrome, Nazeing, Essex. M.C.A. approved 30-hour course; solo flying from 30- per hour; residential; trial lessons, 30-; train from Liverpool Street, or Green Line Coach 715. Tel.: Roddesdon 2042, 2411, 2705. [0220

CONSULTANTS

WING COMMANDER R. H. STOCKEN, F.R.Ae.S., Eagle House, 109, Jermyn St., London, S.W.1. Tel.: Whitehall 6855. [9419

CANADA-GB. Britain Liaison service. Technical and Sales. Personal contact.—W. F. Dunphy, Consulting Air Engineer, Montreal Airport, Montreal, Canada. [8360A

FIRE FIGHTING EQUIPMENT

FIRE engines, sale or hire. Kiddie Lux C.O.2 crash tender, Foreson fire tenders with 700 g.p.m. Tangyre pumps, trailer pumps and 30-gallon foam engines.—Pyrene Co., Ltd., 12 Basely Street, London, E.14. [8393

HANGARS

FOR SALE. Hangar (all steel), 113ft. clear span x 135ft. long x 25ft. clear height at eaves, rising to 35ft. clear at apex. Doors each end (gable optional).

STEEL building 111ft. 6in span over frames (101ft. 4in clear) x 216ft. long x 16ft. (extensible to 29ft.) to eaves. Large doors in sides or ends as required.

HANGAR (all steel), 80ft. clear span x 144ft. long x 22ft. 6in. height at eaves, rising to 32ft. at apex. Doors one end.

STEEL building 80ft. clear span x 144ft. long x 20ft. clear height at eaves. Large sliding doors in sides.

CURVED steel building 36ft. span x 17ft. 6in. high at apex. Up to 600ft. long (low price).

BELLMAN HANGARS, Ltd., Terminal House, London, S.W.1. [9451

INSURANCE

ALL types of aircraft insurance and personal accident cover.—Apply to J. W. T. Amery, Messrs. R. J. Moffat and Co., Percy House, 796, High Rd., Tottenham, N.17. Tel.: Tottenham 3000-49. [0394

MACHINERY

FOUR crankshaft grinders available for immediate delivery, sizes up to 84in. between centres, 28in. swing. Machines can be inspected at Modern Machine Tools, Ltd., Maudslay Road, Coventry. Please send for details today. [9445

MODERN 3-spindle production miller, suitable for the manufacture of jet blades, or any high class production milling work. Available for immediate delivery. Machine can be inspected under power ready to be demonstrated at Modern Machine Tools Ltd., Maudslay Road, Coventry. Please send for details today. [9441

PACKING AND SHIPPING

R. AND J. PARKS, Ltd., 143-9, Fenchurch St., E.C.3. Tel.: Mansion House 3060. Official packers and shippers to the aircraft industry. [0012

PATENTS

THE proprietor of British Patent No. 623630, entitled "Insulating Pads" offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern & Carlberg, 14 East Jackson Boulevard, Chicago 4, Illinois, U.S.A. [9453

THE proprietor of British Patent No. 623634, entitled "Improvements in and method of making insulating pads," offers same for licence or otherwise to ensure practical working in Great Britain.—Inquiries to Singer, Stern and Carlberg, 14 East Jackson Boulevard, Chicago 4, Illinois, U.S.A. [9452

RADIOS

IF you want to sell your aircraft radio equipment, why not contact Aerocontacts, Ltd., Gatwick Airport. Tel.: Horley 1510, Ext. 23. [0892

TENDERS

PAKISTAN AVIATION LTD.

TENDER NOTICE

TENDERS are invited for the purchase of the airship hangar (Kala Chapra) at Karachi Civil Airport on a "where is as is basis."

THE hangar contains approximately 4,900 tons of structural steel and steel sheeting, the dimensions being 800ft. by 230ft. by 200ft.

THE successful bidder will be responsible for the dismantling of the hangar and transportation of the materials arising therefrom, and will be required to deposit 25% of the purchase price before commencing demolition, the balance being paid through an irrevocable letter of credit opened with a bank approved by the Company and realisable on completion of demolition.

INTERNAL offices, workshops, electrical fittings and the contents of the hangar are not included in this offer for sale.

FURTHER particulars of the hangar and authorisations to inspect it may be obtained from the General Manager. Tenders are receivable at the office of the General Manager, Pakistan Aviation, Ltd., Karachi Civil Airport, on or before September 15th, 1952. Tenders should be sent in sealed envelopes marked "H-101." [9442A

TIME RECORDERS

STAFF item checking and job-casting time recorders (all makes) for quick cash sale; exceptional condition.—Box 7261. [0040

TUITION

LEARN to fly for £24; instructors' licences and instrument flying for £3 an hour; night flying £3-10- an hour, residence 5 gns. weekly. Approved M.C.A. private pilot's licence course.—Wiltshire School of Flying, Ltd., Thruxton Aerodrome, Andover, Hants. [0253

SHACKLETON'S

Airspeed Consul

HAVE

Auster Autocrat

ALL

Miles Gemini

THESE

Miles Mercury

AIRCRAFT

Miles Messenger

ACTUALLY

Percival Proctor III. & V.

IN STOCK

D.H. Rapide

AND A LOT MORE!

D.H. Tiger Moth

W. S. SHACKLETON LTD.

EUROPE'S LARGEST AIRCRAFT DEALERS

175 PICCADILLY, LONDON, W.1

'Phone: Regent 3448 9 Cables: Shackbud, London

TUITION

LONDON SCHOOL OF AIR NAVIGATION (1949), LTD.

PERSONAL coaching for Commercial Instrument Rating, Senior Commercial, A.L.T.P. (conversion thereto) and Flight Navigator licences. This school provides the most rapid and economical method of qualifying I.C.A.O. standards.

COMPLETE "Study-as-you-work" courses. Stimulates classroom instruction: lessons, questions, model answers. Unique in application, ideal those employed or seeking career from Services.

LINK instruction and R/T for all instrument rating procedures. Any form of flying training at best quotations.—Brochure with terms: 8-10, King Street, London, W.6. Tel., Riv. 7490. (9277)

AIRCRAFT engineer, "A" and "C" licences. Two-year approved course.

COMMERCIAL pilots and A.L.T.P. technical instruction for general and type rating, conversions, etc.

DIPLOMA course combines full day workshop and technical training for executive appointments.

SYLLABUS (state department) from Engineer-in-Charge, College of Aeronautical and Automobile Engineering, Chelsea, Fla. 0081. N.C (0019)

A.F.R.Ae.S., A.R.B.Certs., A.M.I.Mech.E., etc., on "no pass, no fee" terms; over 95% successes. For details of exams and courses in all branches of aeronautical work, navigation, mechanical eng., etc., write for 144-page handbook free.—B.I.E.T. (Dept. 70B), 17, Stratford Place, London, W.1. (0707)

INSTRUCTORS' Courses on the new Aiglet Trainer by C.F.S. category instructors, also full ground and air instruction for Commercial Pilot's Licence, 30 M.C.A. approved course for Private Pilot's Licence. Limited residential facilities.—Cheltenham Aero Club, Staverton Airport, Cheltenham. (9469)

FREE! Brochure giving details of courses in all branches aero eng., covering A.R.F.Ae.S., M.C.A. exams, etc. We are the only postal training college operated by an industrial organisation.—Write to E.M.I. Institutes, Postal Division, Dept. P.26, 43, Grove Park Road, London, W.4. (Associated with H.M.V.) (0656)

SOUTHEND-ON-SEA MUNICIPAL FLYING SCHOOL. Essex. Tel.: Rochford 56264. Comprehensive training for private, commercial licences and instructor's endorsements. M.C.A. approved for 30-hour course. Tiger Moth and Auster aircraft fitted with radio. Special facilities for training in instrument rating. Hourly rates: solo, day £3; night £4. Dual 5/- extra. Contract rate £2/10/-. Link trainer 10/-. No fees or subscriptions. Trial lesson, 30/-. (0332)

AVIATION, Ltd. (The safe guidance and handling of aircraft in the air.) All June candidates 100% successes (all examination fees paid by Avigation, Ltd.) Postal and direct tuition for all M.C.A. licences, and direct tuition for A.R.B. requirements. The most modern and up-to-date method of presentation and instructional arrangements in our lecture notes. Fully comprehensive (no further text books required), clear and concise; illustrated in colour.

REQUEST sample lesson for comparison and further details.—30, Central Chambers, Ealing, W.5. Tel.: Ealing 8949. N.C (0248)

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

VICKERS-ARMSTRONGS Ltd. (Aircraft Section), have vacancies at Hurn Depot for the following staff:

AIRCRAFT STRESSMEN

DESIGN DRAUGHTSMEN

(aircraft experience preferable, but not essential)

JIG AND TOOL DRAUGHTSMEN

(aircraft experience preferable, but not essential)

APPLY in writing to the Employment Manager, Vickers-Armstrongs, Ltd., (Aircraft Section), Weybridge, Surrey. Applications, with certain exceptions, are subject to the approval of the Ministry of Labour and National Service. (9449)

ROYAL NAVY

YOUNG men between 17 and 26 years are required for short service commissions in the Royal Navy for 8 years' flying duty as pilots or observers. Up to 20 per cent. of those completing the engagement will, if suitable, be given permanent commissions. The remainder will pass to the Reserve for 7 years and be paid a tax-free gratuity of £1,500. Applicants must have School Certificate with a pass in mathematics or a General Certificate of Education with passes at ordinary level, in English language, mathematics and one other subject, or equivalent educational qualifications, and be physically fit.

WRITE to Secretary of the Admiralty (C.W.830), Queen Anne's Mansions, London, S.W.1. (8184)

HANDLEY PAGE, Ltd., have vacancies for:

AERODYNAMICISTS of degree standard or with H.N.C. in aero subjects. Previous experience preferred.

STRESSMEN of degree standard or with H.N.C. in aero subjects. Previous experience preferred.

SENIOR design and intermediate draughtsmen, preferably with aircraft experience, for Cricklewood and Radlett offices. Consideration will be given to applicants with experience in light structural or mechanical engineering. Possession of O.N.C. or H.N.C. (Mech. or Elect.) an advantage.

WEIGHT control engineers, with O.N.C. (Mech.). Previous experience preferred.

TECHNICAL assistants of degree or H.N.C. (Elect.) standard for the design and development of aircraft electrical systems. Previous experience preferred.

SENIOR and junior assistants of degree or H.N.C. standard for the Mechanical and Structural Test Dept. at Radlett.—Write, stating age, qualifications and details of experience to Staff Officer, Handley Page, Ltd., Cricklewood, London, N.W.2. (8211)

FULLY experienced aircraft radio engineer, preferably licenced, required immediately. Good prospects.—Apply Box 1569. (9468)

WELL experienced private licensed pilot without family required for Rapides based Middle East. Salary £1,000 tax free and bonus.—Ring London AMBassador 5030. (9440)

INSTRUMENT mechanic required, "X" licence preferred. Please apply Chief Engineer, Eagle Aviation Ltd., Luton Airport, Luton, Beds. (9447)

AIRWORK, Ltd., requires an "X"-licensed instrument inspector for work on Vikings and Hermes aircraft.—Apply to Manager, Airwork, Ltd., Blackbushe Airport, Nr. Camberley, Surrey. (9421)

AIRCREW leaving the Services. Be qualified before discharge. Obtain your M.C.A. licences through Aviation, Ltd., 30, Central Chambers, Ealing, W.5. Tel.: Ealing 8949. (0249)

KING JUNIOR

DESIGNED for flat or curved panels, and for use on cargo doors, radomes, armament compartments and other access panels. (Special tail pieces can be designed for particular uses.)

Full information on King Junior and King Heavy Duty Cowling fasteners on request to

King Aircraft Corporation

HILLINGTON · GLASGOW · S.W.2

Tel.: HALFWAY 4571 *Telegrams:* Aircraft, Glasgow

Sole Concessionaires in U.S.A.:
Simmonds Aerocessories, Inc., Tarrytown, New York.

Sole Concessionaires in Australia:
Eyelets Proprietary Ltd., 40 Groen Street, Windsor S.1, Melbourne.

AUTOMOBILE ENGINEERING FIRM OF REPUTE IN NORTH WESTERN AREA HAVE IMMEDIATE VACANCIES FOR DETAIL DRAUGHTSMEN BETWEEN THE AGES OF 21 AND 25 YEARS

THESE VACANCIES OFFER GOOD TERMS AND CONDITIONS, ALSO EXCELLENT PROSPECTS FOR RIGHT TYPE OF APPLICANTS

Apply immediately to Box No. 119 c/o Flight, giving as many particulars as possible regarding experience etc.

FLYING TRAINING
TO
HIGHEST MODERN STANDARDS
FOR
Private and Commercial Pilots' Licences
Instructors' Rating

TIGER MOTH & AUSTER £3 per hour
NIGHT FLYING - - - £4 per hour

Contract Rates on Application

Ministry of Civil Aviation Approval

MARSHALL FLYING SERVICES LTD.
THE AERODROME, CAMBRIDGE
Tel.: CAMBRIDGE 56291

DOWTY EQUIPMENT LIMITED

require first class sound

PRACTICAL ENGINEERS

preferably with some experience of design, development and testing of jet engine accessories, particularly flow, acceleration and speed governing controls, burners and pumps. Exceptional prospects of advancement.

SENIOR DRAUGHTSMEN

required for development work on fuel systems. Experience on light hydraulic or pneumatic controls acceptable. Important positions with prospects.

The Company's conditions are exceptionally good; there is a realistic pension scheme and the environment is ideal.

The Company employs a Housing Officer who will render every assistance.

Write, preferably in tabulated form, to

PERSONNEL MANAGER,
DOWTY EQUIPMENT LTD.
Arle Court, Cheltenham.

REQUIRED IMMEDIATELY BY WELL KNOWN AUTOMOBILE ENGINEERING FIRM IN NORTH WEST DISTRICT

Designers and Detail Draughtsmen, Jig and Tool Draughtsmen—also Planning Engineers

THESE VACANCIES OFFER GOOD CONDITIONS AND PROSPECTS TO SUITABLE APPLICANTS. SALARY ACCORDING TO AGE, EXPERIENCE AND QUALIFICATIONS

Apply Box No. 8013 c/o *Flight*

COTTON BAGS
FOR SPARE PARTS, etc.
WALTER H. FELTHAM & SON, LTD.
Imperial Works, Tower Bridge Road,
Telephone: HOP 1784 **LONDON, S.E.1**

SITUATIONS VACANT

D. NAPIER & SON, Ltd., Luton Airport, Beds., invite applications for the following posts:

DRAUGHTSMEN. Power Plant section. Three senior and three detail draughtsmen. Ref. DPT. Flight test section. One senior and two detail draughtsmen. Ref. DFT. Electrical section. One senior electrical and two detail draughtsmen preferably with a bent towards electrical and radio installations. Ref. DE.

PROJECT office designers. Two senior project designers. With aerodynamics and stressing experience. Some knowledge of rocket motor design practice an advantage. Ref. POD.

DESIGN study. Two technical assistants, with knowledge of applied aerodynamics and aircraft performance estimation. Some knowledge of rocket motor performance and assisted take-off devices an advantage. Ref. DS.

AERODYNAMICS. Two technical assistants, one senior and one junior for work on general aircraft problems and guided weapons. Supersonic experience desirable. Ref. AD.

ROCKET motor development. Three technical assistants of degree or Higher National Standard. One junior technical assistant for film analysis and computing from rocket motor test results. Ref. RMD.

ROCKET motor project analysis. Two senior technical assistants (thermodynamicists) for rocket motor project investigations. Some experience of high-speed pumps and turbines an advantage. Degree standard necessary. Ref. RMPA.

RAMJETS. One senior technical assistant (thermodynamicist) of engineering degree standard for work on ramjet investigations. One computer (male or female) of at least matriculation standard. Ref. RJ.

FUEL metering. Two senior technical assistants for work on fluid control and metering problems, with experience on aircraft and/or ramjet fuel systems. Engineering degree or H.N.C. essential. Ref. FM.

POWER plant development. Two engineers with experience in turbine and piston engines (theory and practice) engineering degree or H.N.C. essential. Ref. PPD.

STRUCTURES section. One technical assistant for work on experimental vibration testing and analysis of guided weapon and aircraft structures. Degree of H.N.C. essential. One technical assistant for structural testing and development. Experience in stress analysis and degree or H.N.C. essential. Ref. SS.

RIG testing. One mechanical assistant with engineering apprenticeship and at least O.N.C. Some experience of test rig operation necessary involving fluid control and measurement. Also one electronic wireman and one aircraft fitter to assist with de-icing investigations. Ref. RT.

INSTRUMENT shop. Two electronic assistants, familiar with C.R.O. practice for instruments laboratory. Instrument shop foreman to take charge of small experimental shop. Instrument maker with experience of aeronautical instruments for engine flight test. Ref. IS.

FLIGHT development. Senior technical assistant for flight development testing of experimental engines, preferably degree in mechanical engineering or at least H.N.C. with similar previous experience on gas turbines or aero engine development. Junior technical assistant with similar qualifications and apprenticeship in engineering. Four male or female computors. Ref. FD.

STRESS section. Two aircraft stressmen required for work on interesting problems in connection with aero engine installations. Applicants must have at least five years experience in aircraft stressing and education to H.N.C. standard. Ref. S.S. Accommodation available for single men immediately—all possible assistance given to married applicants.

APPLY with fullest possible particulars of age, experience, qualifications and salary expected to your local Employment Exchange. Quoting in all cases the Reference letters for the particular applications. [8454

THE PARSONS AND MARINE ENGINEERING TURBINE RESEARCH AND DEVELOPMENT ASSOCIATION has vacancies for research engineers:—

(a) in connection with full scale trials on steam and gas turbine prototypes.
(b) for gas turbine combustion work.
(c) for research on steam and gas turbine components.
(d) for research on aerodynamic and heat transfer problems in turbine machinery.
(e) for advanced mathematical computation of mechanical problems.
(f) for steam and gas turbine design work.

CANDIDATES should possess a good honours degree. Good salaries are offered, the scale depending on qualifications, experience, and age. Application should be made in writing to the Research Director, Parsons Research Station, Wallsend-on-Tyne. [8444

LICENSED radio engineer and radio mechanics at our base at Stansted Airport, Essex.—Apply by letter or telephone to the Senior Radio Engineer, Aviation Traders, Ltd., Southend Airport, Essex. Tel.: Rochford 54401. [8060

PORTSMOUTH AVIATION have vacancies for stressmen of all grades for super-priority work at Portsmouth and Hurn Airports.—Apply: The Airport, Portsmouth. [8151

NORMALAIR, Ltd., Yeovil, invite applications from the following for work in connection with the aircraft air-conditioning, pressurizing and high-altitude breathing equipment:—

DRAUGHTSMEN,
TECHNICIANS,
TECHNICAL WRITERS.

APPLICATIONS, stating age, experience and salary required, should be addressed: Employment Exchange (N.A.), Yeovil. Local interviews will be arranged where convenient. [8374

APPLICATIONS are invited from senior and junior stressmen and draughtsmen for work on new designs. Applications should state age, experience, qualifications and salary expected.—Auster Aircraft, Ltd., Rearsby Aerodrome, Leics. [8308

ENGINEER with experience of testing and maintenance of aircraft hydraulic systems and actuators. Higher National Certificate desirable.—Write fully, stating age, experience, to Box F.394, at 191, Gresham House, E.C.2. [8149

TECHNICAL assistant, 25-35, of British nationality, required for interesting and varied work in heat exchange test laboratory. Apply in writing to Delaney Gallay, Ltd., Edgware Road, Cricklewood, London, N.W.2 [8041

INDUSTRIAL gas turbines. Applications are invited from engineers capable of taking complete charge of an industrial gas turbine development programme. Applicants should be capable of handling both the theoretical and the practical side of gas turbine design and must have previous experience in a similar capacity, preferably on industrial gas turbines, although a comparable position in the field of aircraft gas turbines might be considered suitable.—Box 1593. [8478

THE DE HAVILLAND AIRCRAFT CO. LTD.

have vacancies for

SENIOR AND INTERMEDIATE DESIGN DRAUGHTSMEN in their HATFIELD and LONDON OFFICES

Men with experience in

STRUCTURES DESIGN
MECHANICAL DETAILS
ELECTRICAL INSTALLATIONS
are invited to apply

Aircraft experience preferred but applications will be considered from men experienced in light Mechanical Engineering or Wiring Layouts, Design of Electrical Junction Boxes, etc.

Large programme of work on CIVIL JET AIRLINERS AND MILITARY AIRCRAFT

Apply in writing to

The Chief Draughtsman,
THE DE HAVILLAND AIRCRAFT CO. LTD.,
Hatfield, Herts.

Applications are subject to approval of Ministry of Labour and National Service

GLOSTER AIRCRAFT CO., LTD.

HUCCLECOTE • GLOUCESTER

The following **VACANCIES** exist on progressive projects of advanced interest:—

STRESSMEN
Senior and Intermediate

WEIGHTSMEN
Senior and Junior

DRAUGHTSMEN
Structural and Electrical

Previous aircraft experience an advantage but not essential

Prospects are excellent for energetic and sound applicants

APPLICATIONS to be addressed to the **CHIEF DESIGNER** giving particulars of **Experience, Age and Salary**

SITUATIONS VACANT

ENGINEER with experience of the testing and maintenance of aircraft gyroscopic and servo equipment. Higher National Certificate standard of education.—Write fully, stating age, experience, to Box F.362, at 191, Gresham House, E.C.2. [8414]

BLACKBURN & GENERAL AIRCRAFT, Ltd., have vacancies at Brough for two draftsmen with experience on aircraft work.—Applications, giving particulars of age, training, experience, etc., to the Personnel Superintendent, Brough, E. Yorks. [8439]

SENIOR electronic engineer required. Experience of helicopter instrumentation and of analogue computers would be an advantage.—Apply, stating experience, age, etc., to the Personnel Officer, Saunders-Roe, Ltd., Southampton Airport, Eastleigh, Hants. [8395]

FIRST CLASS ground engineer required for India. Qualifications at least A. and C. licence with experience on Dove, Pratt and Whitney, and Continental (Beech Bonanza) engines.—Write, in first instance, to Box [illegible] [8477]

EAGLE AVIATION, Ltd., have vacancies for the following aircrew categories: flight radio operators holding first class M.C.A. licence; flight engineers holding "A" and "C" Licences, for York and Merlin 500.—Please apply Chief Pilot, Luton Airport, Beds. [8470]

ASSISTANT chief stressman required by Percival Aircraft Ltd., Luton Airport, Beds. Good welfare facilities, including staff pension scheme.—Applications, giving full details of qualifications, experience, age and salary required, to the Manager, Ministry of Labour and National Service, Luton. [8508]

TECHNICAL authors and illustrators required by Percival Aircraft Ltd., Luton Airport, Beds. Knowledge of M. & S. procedure desirable. Good welfare facilities, including staff pension scheme.—Applications, in writing, stating age, experience and salary required, to Manager, Ministry of Labour and National Service, Luton, Beds. [8504]

AIRCRAFT estimators, ratefixers and inspectors required for interesting work. Good canteen and sports facilities. After satisfactory probation, key workers can be recommended for houses.—Apply Personnel Dept., Vickers-Armstrongs Ltd., South Marston, nr. Swindon, Wilts. [8437]

LOFTSMEN required; previous aircraft experience not essential. Apply Employment Manager, Vickers-Armstrongs, Ltd. (Aircraft Section), Weybridge, Surrey.—Applications, with certain exceptions, are subject to the approval of the Ministry of Labour and National Service. [8450]

WEIGHT estimator required by Percival Aircraft, Ltd., Luton Airport, Beds, for work on fixed wing and helicopter aircraft. Good welfare facilities, including staff pension scheme.—Apply, giving details of age, qualifications, experience and salary required, to Manager, Ministry of Labour and National Service, Luton, Beds. [8502]

H. M. HOBSON, Ltd., invite applications for positions in the drawing office as follows: designers, detail and modification draughtsmen, checkers, stressmen. The work is concerned with interesting projects connected with fuel metering equipment and hydraulic flying controls for aircraft.—Hobson Works, Fordhouses, Wolverhampton. [8430]

LANCASHIRE AIRCRAFT CORPORATION, Ltd., Bovingdon Airport, Herts., require qualified pilots, navigators and radio officers for their York fleet. Only applicants holding appropriate M.C.A. licences will be considered. Please write full details to the Personnel Manager at above address. [8396]

TECHNICAL assistants, experienced in dealing with electronic measurement and instrumentation, required for work on servo engines and their application. Candidates, aged between 25 and 30, possessing degree or diploma and willing to deal with problems during flight preferred.

APPLICATIONS, stating age, qualifications, and details of experience, should be addressed to the Divisional Personnel Manager, The Bristol Aeroplane Co., Ltd., Engine Division, Filton House, Bristol. [8399]

SENIOR design and intermediate draughtsmen with good experience of aircraft or light structural or mechanical engineering required for interesting development project work at Portsmouth and Hurn offices.—Apply by letter to Portsmouth Aviation, Ltd., The Airport, Portsmouth.

TEST laboratory assistants (male) required by Percival Aircraft, Ltd., Luton Airport, Beds. National Certificate standard and previous experience on design of test laboratory equipment desirable. Good welfare facilities, including staff pension scheme.—Applications, stating qualifications, experience, age and salary required, to Manager, Employment Exchange, Luton, Beds. [8506]

REQUIRED immediately by Percival Aircraft, Ltd., Luton Airport, Beds, several draughtsmen with comprehensive experience of engine installations and allied systems. Good welfare facilities, including staff pension scheme.—Applications, in writing, stating age, qualifications, experience and salary required, to the Luton Employment Exchange. [8501]

A VACANCY occurs for a mathematician interested in all stress problems, with a degree in mathematics and an interest in the field of elasticity. Some practical experience in stress analysis work is desirable, but not essential. The company is situated in the West Midlands, undertaking work connected with the guided weapons project. —Applications to Box 1531. [8493]

APPLICATIONS are invited from senior and intermediate design draughtsmen. Experience of aero-engine design desirable, but not essential. Also checkers. —Please write, stating age and giving details of previous experience in chronological order, to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [8498]

CHIEF test engineer required by large firm, S.E. England, for aeronautical division, with good technical education to B.Sc. standard. Practical experience of production problems connected with electronic servos in the aircraft industry. Progressive post. Pension scheme. —Write fully, stating age, experience, to Box F.380, at 191, Gresham House, E.C.2. [8409]

TWO engineers with experience of the testing and maintenance of airborne electronic equipment. For one post experience of servo-mechanisms would be an advantage. For the other, experience of radio transmitter-receivers. Applicants must have Higher National Certificate.—Write fully, stating age, experience, to Box F.393, at 191, Gresham House, E.C.2. [8417]

DRAUGHTSMEN and stressmen with aircraft experience required for interesting and progressive work on new designs. Permanent positions at attractive salaries for capable applicants. Opportunities for cheap flying with firm's Flying Club. Housing arranged and assistance given. —Applications to Chief Designer, Auster Aircraft, Ltd., Rearsby, Leicester, or through local Employment Exchange. [8389]

SITUATIONS VACANT

APPLICATIONS are invited from design draughtsmen and stressmen, also technical assistants with combined design and performance experience for work on both reciprocating and gas turbine aero engines.—Applications should state full particulars of experience and qualifications and should be addressed to the Personnel Officer, The de Havilland Engine Co., Ltd., Stag Lane, Edgware, Middlesex. [8392]

ESTIMATORS (aircraft, male) required by Percival Aircraft, Ltd., Luton Airport, Beds. Fully conversant with general construction and preferably with previous experience in similar capacity. Good welfare facilities including staff pension scheme.—Applications, in writing, to the Manager, Employment Exchange, Luton, Beds., stating age, experience and salary required. [8473]

PLANNING engineer (aircraft) required by Percival Aircraft, Ltd., Luton Airport, Beds. Considerable practical experience of manufacture of metal airframe components and production planning essential qualifications. Good welfare facilities including staff pension scheme.—Apply to the Manager, Employment Exchange, Luton, giving full details of age, qualifications, experience and salary required. [8474]

AIR FORCE, Naval, civil and helicopter aircraft all under design and development at Percival Aircraft, Ltd., Luton Airport, Beds. Applications are invited from senior and junior draughtsmen and stressmen, for work on this interesting programme. Good welfare facilities, including staff pension scheme.—Write, giving details of experience and salary required, to Manager, Ministry of Labour and National Service, Luton, Beds. [8505]

WORKS manager required with considerable administrative and manufacturing experience on all-metal aircraft. Applicants must have held similar position for some years. Good prospects with excellent salary and pension scheme offered to successful applicant. Please give full particulars of previous appointments held, qualifications, age and salary required, to The Managing Director, Percival Aircraft Ltd., The Airport, Luton, Beds. [8462]

HYDRAULICS Engineers Co. desirous of commencing manuf. of hydraulic equip. for materials, handling equip. of which sale is assured regs. cap. hydraulic engineer with exp. of design, development and production of suitable hydraulic equip. and circuits. Undoubtedly very progressive situation as successful applicant will be able to initiate own ideas. Please write fully, stating age, exp., quals., salary, if single, etc., to Box 1516. [8442]

PLANNING engineer (aircraft) required by Percival Aircraft, Ltd., Luton Airport, Beds. Considerable practical experience of manufacture of metal airframe components and production planning essential qualifications. Good welfare facilities including staff pension scheme.—Apply to Manager, Employment Exchange, Luton, giving full details of age, qualifications, experience and salary required. [8507]

NORMALAIR, Ltd., require for the London office first-class design and detail draughtsmen, experienced in light mechanical precision engineering or instrument practice and with aircraft background, for aircraft pressurising and high-altitude breathing equipment. Good working conditions, and superannuation.—Apply stating age, experience, qualifications and salary required, to Employment Exchange (N.A.), Yeovil, Somerset. [8373]

JABROC
SAVES STEEL
For PRESS TOOLS, JIGS, TEMPLATES
Easily Machined · Easy to Handle
Board sizes: 92" x 32" and 68" x 44". Up to 3 inch thickness
MOULDED COMPONENTS (JABLO) LTD.,
Jablo Works, Waddon, Croydon, Surrey
Phone: CROydon 2201. Grams: JABLO CROYDON

AIRCRAFT & MECHANICAL DETAIL DRAUGHTSMEN REQUIRED
for a wide range of interesting, high priority, experimental and development work. Excellent opportunities for young keen men who have completed their apprenticeship to obtain design experience.
Salary A.E.S.D. rates and upwards
Please write giving age and experience to:
Chief Draughtsman
M.L. AVIATION CO., LTD.
WHITE WALTHAM AERODROME
MAIDENHEAD, BERKS.

SITUATIONS VACANT

RADIO mechanic required, experienced on T/R 1154/55 and V.H.F. R/T equipment at Plymouth Airport, Crownhill, Plymouth. Tel.: Plymouth 72705 and apply Employment Exchange or Scheduled Employment Agency. [8463]

TECHNICIANS—aircraft. The Aircraft Design Technical Office of the Bristol Aeroplane Co., Ltd., requires the following personnel for work on an interesting range of civil and military aircraft and helicopters in their engineering development laboratory: Junior and intermediate technicians with Higher National Certificate and preferably some experience of structural or general engineering test work. These appointments offer excellent opportunities for advancement on merit.

APPLICATIONS should be sent to the Ministry of Labour and National Service, 20, Nelson Street, Bristol 1, and marked for the attention of the Personnel Manager, The Bristol Aeroplane Co., Ltd., Aircraft Division, Filton House, Bristol. [8375]

AIRCRAFT draughtsmen are required by the English Electric Co., Ltd., at Warton Aerodrome, near Blackpool. There are a number of vacancies for men having good aircraft drawing-office background. Good salaries will be paid according to age, qualifications and experience.—Write, giving full details and qualifications, and quoting reference "English Electric 123M," to Westminster Employment Exchange, Chadwick Street, London, S.W.1. [8426]

VACANCIES exist for senior and junior electronic engineers, on work in connection with the electronic measurement of physical variables and associated problems. This consolidation and expansion of a young department offers scope for men with enterprise and ability.—Applications, stating age, full details of qualifications, experience and salary required, should be addressed to the Personnel Officer, Saunders-Roe, Ltd., East Cowes, I.O.W. [8423]

TECHNICAL sales manager required by large well-known company in the Home Counties. Qualifications to cover radio electronics, light electrical engineering and allied equipment. High level industrial contacts essential. Salary commensurate with experience and qualifications. Some post qualified to hold a four-figure income. Ex-RAF not to apply.—Applications, which will be treated in strict confidence, should be made in writing quoting reference J.84, to Box 1517. [8446]

EXPERIENCED electronic engineer required by the English Electric Co., Ltd., Luton, for investigation into the nature of mechanical vibrations in connection with guided missiles project. Position of responsibility in a new department is available for a well-qualified man. Adaptability and ability to develop electronic measuring techniques required. H.N.C. or equivalent and some experience of vibration work essential. Salary according to qualifications.—Please write, giving full details of qualifications and experience, and quoting Reference "EC," to Central Personnel Services, English Electric Co., Ltd., 24-30, Gillingham Street, London, S.W.1. [8390]

MECHANICAL engineer required by the English Electric Co., Ltd., Luton, for vibration investigation on an important guided missile project. Previous experience of vibration work an advantage, but not essential. A sound grasp of mathematics and mechanics up to National Certificate standard is necessary, together with personal reliability and the ability to improvise. A working knowledge of electrical test equipment an advantage. Salary according to qualifications.—Please write, giving full details and quoting reference "English Electric 1020," to Westminster Employment Exchange, Chadwick Street, London, S.W.1. [8397]

ENGLISH ELECTRIC Co., Ltd., Luton, require senior and junior designers, capable of working with a minimum of supervision on design and development of hydraulic components, pneumatic components and aircraft fuel systems. Higher National Certificate or equivalent and good drawing office experience essential. Excellent prospects for advancement on a project of the highest priority. Salary £450 to £800, according to age, qualifications and experience. Suitable candidates without the specialized experience stated will be considered as trainees.—Please write, giving full details and quoting Ref. 491C, to Central Personnel Services, 24-30, Gillingham Street, London, S.W.1. [8396]

C. A.V., Ltd., have a vacancy in their research department for a graduate engineer, preferably with an honours degree, who will be required to undertake a programme of research on combustion research associated with the development of Diesel fuel injection systems. This programme offers unusual scope for initiative and original thought. Some prior knowledge of laboratory engine testing procedure would be of advantage, but industrial experience in this field is not essential. Salary according to ability and experience, £550-£750 p.a. The appointment will include participation in a pension scheme, and affords considerable opportunities for advancement.—Applications should be addressed to The Personnel Manager, C.A.V., Ltd., Acton, W.3. [8445]

WELL-KNOWN instrument manufacturers situated in West of England have a vacancy for a senior project engineer to direct work of a team employed on design and development of a wide range of mechanical aircraft instruments and allied equipment. Applicants should possess qualifications in engineering and/or physics and previous experience in the design of pressure sensitive elements, small mechanisms and gears, together with a practical knowledge of metallurgy and general aircraft requirements. The post is pensionable and carries a salary of £650-£1,200, depending upon experience and qualifications. (Housing assistance will be given).—Write, quoting reference 6/EN, to: Personnel Manager, S. Smith & Sons (England) Ltd., Bishops Cleeve. [8448]

SITUATIONS WANTED

ASSISTANT instructor, shortly qualifying for full endorsement, desires position.—Box 1548. [8404]

PILOT, 1,200 hours, commercial and R/T licence, academic instrument rating, seeks flying position.—Box 1542. [8407]

PILOT (29), 1,342 hrs. commercial, I.R. and R/T licences, D.C.3 Group I. Previous airline and administrative experience, requires free-lance or permanent employment. —Box 1520. [8457]

NAVIGATOR (35), ex-R.A.F., approx. 1,500 hrs., five years' experience as navigation instructor. Any offers of employment or advice welcomed.—Box 1546. [8405]

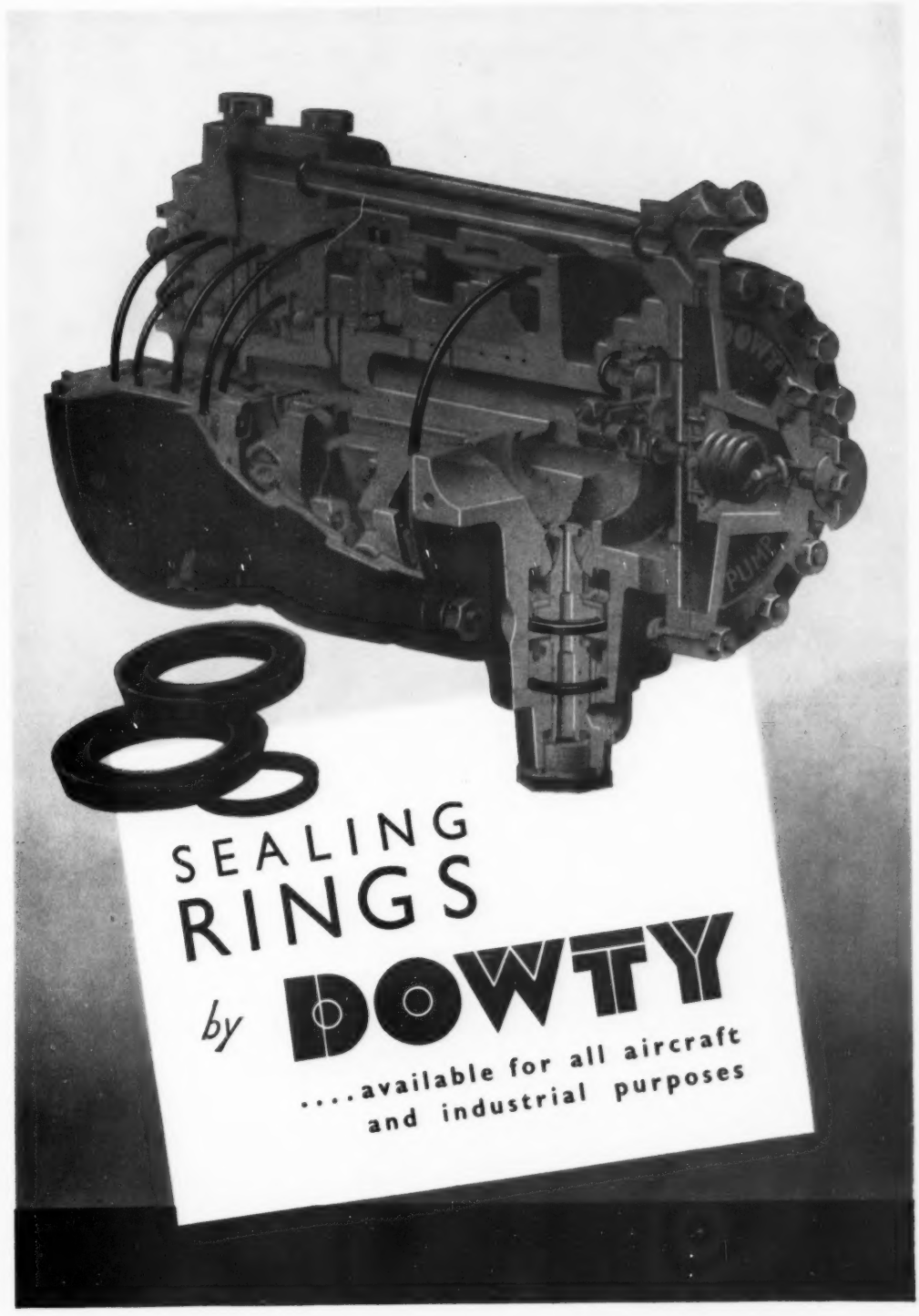
WANTED

WANTED, Verey pistols, 1½ in.—Box 1384. [8479]

BOOKS, ETC.

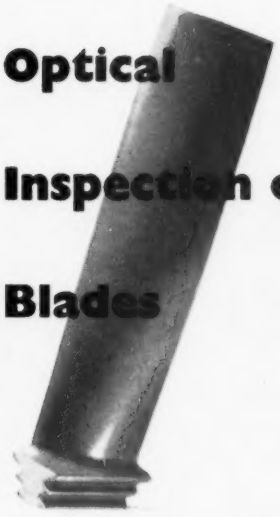
100 COPIES *Flight*, 1945/47.—Offers to Box 1535. [8478]

Printed in Great Britain for the Publishers, ILIFFE & SONS LTD., Dorset House, Stamford Street, London, S.E.1, by SUN PRINTERS LTD., London, and Watford, Herts. *Flight* can be obtained abroad from the following: AUSTRALIA AND NEW ZEALAND: Gordon & Gotch, Ltd. INDIA: A. H. Wheeler & Co. CANADA: The Wm. Dawson Subscription Service, Ltd.: Gordon & Gotch, Ltd. SOUTH AFRICA: Central News Agency, Ltd.; Wm. Dawson & Sons (S.A.), Ltd. UNITED STATES: The International News Co. Entered as Second Class Matter at the New York, U.S.A., Post Office.


SEALING
RINGS
by DOWTY
....available for all aircraft
and industrial purposes

PRECISION FACTORS CONTRIBUTING TO *Bristol* ENGINE EFFICIENCY

Optical Inspection of Blades



The instrument illustrated makes possible rapid and accurate inspection of the profile and blade angle of compressor and turbine blades. The system is an optical one, and was invented by "Bristol" employees. It gives a magnified image of the blade profile which is compared with a master form traced on a viewing screen (see illustration left). The instrument is housed in a darkened cubicle, and the blade is set up so that the section to be inspected is illuminated by a narrow band of light from six lamps surrounding the blade. A lens near the tip of the blade and co-axial with it, projects the image of the illuminated blade section on to the screen, where it appears as a dark shadow surrounded by a band of light. The magnification may be varied, but is normally 20 diameters so that any errors are easily detected. This is one of many precision instruments used in the manufacture of "Bristol" turbine engines.

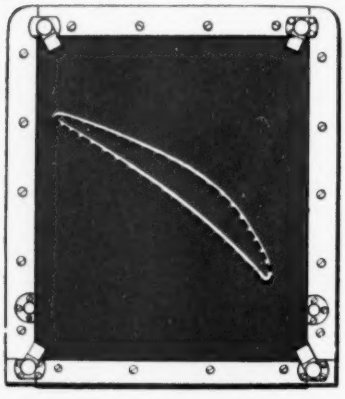


Illustration shows viewing screen with image in white outline and master form in black dash outline.

Bristol **Sleeve-valve and turbine engines for reliability and economy**

997E

THE BRISTOL AEROPLANE COMPANY LIMITED · ENGLAND